EFFICACY OF HOSPITAL CORNEA RETRIEVAL PROGRAM IN ALLEVIATING CORNEAL BLINDNESS

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CERTIFICATE

This is to certify that this dissertation entitled **"EFFICACY OF HOSPITAL CORNEA RETRIEVAL PROGRAM IN ALLEVIATING CORNEAL BLINDNESS"** is a bonafide work done by **Dr.Vinitha L Rashme** under our guidance and supervision in the cornea department of Aravind Eye Hospitals and Post Graduate Institute of Ophthalmology, Madurai during the period of her post graduate training in Ophthalmology for May 2015 -May 2018.

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DECLARATION

I, **Dr.Vinitha L Rashme** hereby declare that this dissertation entitled, **"EEFICACY OF HOSPITAL CORNEA RETRIEVAL PROGRAM IN ALLEVIATING CORNEAL BLINDNESS"** is being submitted in partial fulfilment for the award of M.S. in Ophthalmology Degree by the Tamilnadu Dr. MGR Medical University in the examination to be held in May 2018.

I declare that this dissertation is my original work and has not formed the basis for the award of any other degree or diploma awarded to me previously.

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- Plagiarism report

1.1 INTRODUCTION

WHO states that 285 million people are estimated to be visually impaired 39 million are blind and 246 have low vision. National program for control of blindness in India estimated the prevalence of blindness to be 1.1%. Major cause of blindness are as follows: cataract (62.5%) refractive error (19.70%) corneal blindness (0.9%), glaucoma (5.80%), surgical complications (1.20%) posterior capsular opacification (0.90%) posterior segment disorders (4.70%), others (4.19%).

Corneal blindness is the second leading cause of blindness in developing countries. According to Rapid assessment of avoidable blindness conducted in India by MOH & FW 2006-2007 corneal blindness constitutes 1% of total blindness. (2)

Corneal blindness when compared to cataract affects younger population and hence has higher Disability –Adjusted Life Years (DALY) score. (9)

The major causes of corneal blindness in India are ocular trauma, infectious keratitis, pseudophakic bullous keratopathy, hereditary dystrophies, and corneal injury, trachoma and vitamin A deficiency. (2)

Effective public health strategies can reduce the load of corneal blindness but corneal transplantation remains a major option for treatment of blindness due to corneal opacity (3).

1.22 lakh are bilaterally corneal blind in the country. Out of 1.22 lakh corneal blindness only 60,000 are eligible for optical penetrating keratoplasty due to pre existing posterior segment pathology. 20,000-30,000 new cases are added to the case pool every year. (15). Hence a constant supply of high quality donor corneal tissues is required to reduce the prevalence of corneal blindness. The factors that determine the outcome of the transplantation are quality of donor cornea, the underlying corneal pathology of the recipient and appropriate post operative care. The main goal of the eye bank is to procure and supply quality donor corneas to the corneal surgeons. Only 50% of donor corneas are utilized for optical keratoplasty. (15) Eye banks collect 50,000 corneas per year on average and so we need 2 lakh corneas per year to meet the demand.

The tissues obtained through voluntary eye donations were not enough to meet the demand so Eye banks introduced Hospital cornea retrieval program and L V Prasad eye institute first implemented it in the year 1990. Here eye donation counselors present in the hospital approach the family of the potential donor as soon as they receive the death notification. They motivate the family members and encourage them to donate the eyes of the deceased. The advantages of HCRP are availability of young donor, easy collection of blood for serology,

availability of medical records, reduction of death to enucleation time and good quality tissue (8). So our aim is to study the efficacy of HCRP by comparing it with Home retrieval in terms of demography, quality of the donor tissue and it's utilization and to study the long term benefits of HCRP by conducting post operative follow up on patients who underwent optical keratoplasty using corneas obtained through HCRP.

1.2 CORNEAL BLINDNESS

Corneal blindness is the second most common cause of blindness in developing countries. According to WHO data 4.9 million people are bilaterally blind. Studies in India and Africa show much high prevalence. 20 % of who “undetermined “causes of blindness is attributed to corneal blindness with regional factoring from 2% to 40%(9).

Avoidable corneal blindness:

It includes preventable and treatable causes. In a study in Andhra Pradesh they have stated that 95% of corneal blindness was avoidable (19). Avoidable corneal blindness includes keratitis, trauma, aphakic bullous keratopathy, severe astigmatism post cataract surgery and traditional eye medicines.

In pediatric age group ocular trauma, infectious keratitis, corneal ulceration and post infectious keratitis corneo-iridic scars are the most common causes. Congenital corneal disorders like hereditary dystrophies, congenital glaucoma, peter’s anomaly, birth trauma and metabolic disorders contribute to childhood blindness.

In adults various causes include bacterial fungal, or viral keratitis, hereditary dystrophies and trauma.

Predisposing factors for corneal ulceration include ocular disease (38.2%), previous ocular surgery in same eye (29.4%), trauma (17.6%) and systemic disease (16.7%). (20)

Etiological classification:

1. Infections

a) Infectious keratitis

b) Trachoma

2. Nutritional disorders

a) Vitamin A deficiency

3. Inherited

a) Corneal dystrophies

4. Trauma

a) Corneal abrasion

b) Penetrating trauma

c) Chemical injury

5. Iatrogenic

a) Pseudophakic bullous keratopathy

Infectious keratitis

Spectrum of microbial keratitis depends on so many factors like local climate, occupation etc. It is more common in rural population, people belonging to lower economic strata and illiterate with poor knowledge about proper eye care.

Among culture positive cases of microbial keratitis 63% were fungal and 35.7% were of bacterial etiology. The predominant fungal organism was Fusarium spp (42.3%) and the predominant bacterial organisms were Streptococcus pneumoniae (35.1%) Pseudomonas aeruginosa (24.3%), and Nocardia spp (8.1%). (21).

Corneal injury was found to be the predisposing factor in 91.9% of fungal keratitis, 28.1% in bacterial keratitis and 100% in Acanthamoeba keratitis.

Coexisting ocular disease seen in 69% of patients with bacterial keratitis. (22)

Use of traditional medicines is an important risk factor for corneal ulceration. They serve as a vehicle for spread of pathogenic organisms.

They can also cause corneal damage by their toxic effect. Popular traditional medicines include human milk, goat milk, castor oil and leaves extracts (23). Health education and awareness about primary health care following trauma is very important to reduce the incidence of corneal blindness. Village level workers can effectively implement and sustain corneal ulcer prevention at village level by simple public health strategies. In scarred, vascularized tissue corneal transplantation is rarely successful hence preventive corneal measures will be more successful and cost effective in decreasing corneal blindness.

Trachoma:

It is one of the leading causes of infectious blindness. There are 1.3 million people blind from the disease (24). In India active trachoma is seen in 6% of children less than 10 years of age. Five endemic states include Gujarat, Rajasthan, Uttar Pradesh, Haryana and Punjab. (25). SAFE strategy implementation is used to prevent trachoma related blindness.

Vitamin A deficiency:

It is the single most frequent cause of blindness in preschool children. Vitamin A deficiency contributed to 26.7% of childhood blindness in Madhya Pradesh and 7.5% in Kerala. 19% of childhood blindness in India is attributed to Vitamin A deficiency. (26)

Corneal dystrophies:

Heterogeneous group of inherited corneal disease that is more common in developed countries. In India it contributes to 8.1% of all keratopathy performed. Macular corneal dystrophy, congenital hereditary endothelial dystrophy, Fuchs dystrophy and lattice dystrophy were most commonly seen in India. (27).

Trauma:

It is a significant cause of blindness in developing countries. Chemical injuries with acid and alkali are commonly seen in younger age group.

Penetrating injuries are common in pediatric age group. Most of these injuries can be prevented. In rural population of India blunt trauma, injury with vegetative matter is the most frequent causes of trauma.

Pseudophakic/aphakic bullous keratopathy.

Incidence of pseudophakic bullous keratopathy is increasing with increase in cataract surgical rate.

1.3 CORNEAL TRANSPLANTATION

Corneal transplant is the procedure of choice to combat corneal blindness. The idea to replace diseased cornea originated in 18th century in the mind of a Frenchman named GPDe Quengsy. Reisinger coined the term keratoplasty in the 19th century and Zirm performed the first successful human penetrating corneal transplantation in 1905.

Corneal transplantation is a surgical procedure where a damaged or diseased cornea is replaced by donated corneal tissue in its entirety or in part. The graft is taken from a recently deceased individual with no known diseases or other factors that may affect the viability of the donated tissue or the health of the recipient.

The indications of keratoplasty are:

1. Optical – to clear the visual axis for visual rehabilitation
2. Therapeutic – to eliminate the corneal infection/load in refractory cases
3. Tectonic – to preserve the structural integrity of the globe
4. Cosmetic-to improve appearance of the eye

In developed world the main indications of penetrating keratoplasty are:

1. Pseudophakic bullous keratopathy
2. Keratoconus
3. Fuch's corneal dystrophy

In developing world the main indications of penetrating keratoplasty are

1. Corneal scarring
2. Adherent leucoma\active infectious keratitis
3. Corneal perforation
4. Pseudophakic bullous keratopathy
5. Keratoconus
6. Fuch's corneal dystrophy
7. Corneal dystrophies

Techniques of keratoplasty:

Keratoplasty can be

1. Penetrating keratoplasty
2. Lamellar keratoplasty

Penetrating keratoplasty:

Penetrating keratoplasty comprises of replacement of the full thickness host corneal tissue with full thickness donor corneal tissue.

Prognosis for graft clarity in penetrating keratoplasty depends on

- Initial pathological condition of host cornea
- Quality of donor tissue
- Surgical technique
- Timing of surgery
- Post operative care etc.;

Anatomical success is by achieving a clear and thin graft while functional success means significant visual improvement (two or more lines of Snellen's visual acuity chart) post operatively.

Lamellar keratoplasty:

Lamellar keratoplasty targets to remove partial thickness of pathological host tissue and is replaced with donor tissue of similar size and thickness thus retaining normal host tissue.

Lamellar keratoplasty is of following types:

1. Anterior Lamellar Keratoplasty-replaces the anterior stroma:
    - ALK- Anterior Lamellar Keratoplasty
    - DALK- Deep Anterior Lamellar Keratoplasty
    - FALK- Femtosecond laser assisted Anterior Lamellar Keratoplasty
2. Posterior Lamellar Keratoplasty- deep stromal and endothelial layers are replaced.
    - DLEK- Deep Lamellar Endothelial Keratoplasty
    - DSEK-Descemet's Stripping Endothelial Keratoplasty
    - DSAEK- Descemet's Stripping Automated Endothelial Keratoplasty
    - DMEK- Descemet's Membrane Endothelial Keratoplasty

- FLEK-Femtosecond laser assisted Endothelial Lamellar Keratoplasty

Advantages of Lamellar Keratoplasty over conventional Penetrating Keratoplasty are:

- ✓ Its extra ocular procedure
- ✓ Reduces intra ocular complications such as Glaucoma, cataract formation, Cystoid macular edema, retinal detachment, endophthalmitis, expulsive choroidal hemorrhage etc.
- ✓ No risk endothelial graft rejection in case of anterior lamellar keratoplasty
- ✓ Stronger corneal wound- and less chance of traumatic Graft host junction wound dehiscence
- ✓ Larger graft can be performed
- ✓ Penetrating Keratoplasty can be done at a later date if required.

For any transplant involving the corneal endothelium, requires a minimum endothelium cell density (EDC) of at least 2000 cells/mm^2 in order to be used for optical keratoplasty. For DSAEK EDC more than 2000 cells/$^{mm2\ are}$ preferred. If the EDC is less than 2000 cells/mm^2 it can be used for Deep Anterior Lamellar Keratoplasty, therapeutic keratoplasty and patch grafts.

1.4 EYE BANKING:

Eye bank:

"An eye bank is a non profit organization with an aim to acquire and provide donated human eye tissue for corneal transplantation procedures in addition to providing vital tissue for research and education. It also stores and preserves corneal tissue for future use."

Dr. Townley Paton and Dr. John MacLean founded the First eye bank in the year 1944 in New York City. In India it was started in regional institute of ophthalmology in Madras in the year 1945. Dr. Dhanda performed first corneal transplantation in India in 1960.

Eye bank association of India was established in the year 1990. It co-ordinates with all eye banks and helps in providing training to eye bank technicians in order to improve the quality and quantity of corneal tissues.

Current Eye bank scenario in India:

Eye bank training centers: 5

Eye banks: 176

Eye donation centers: 428

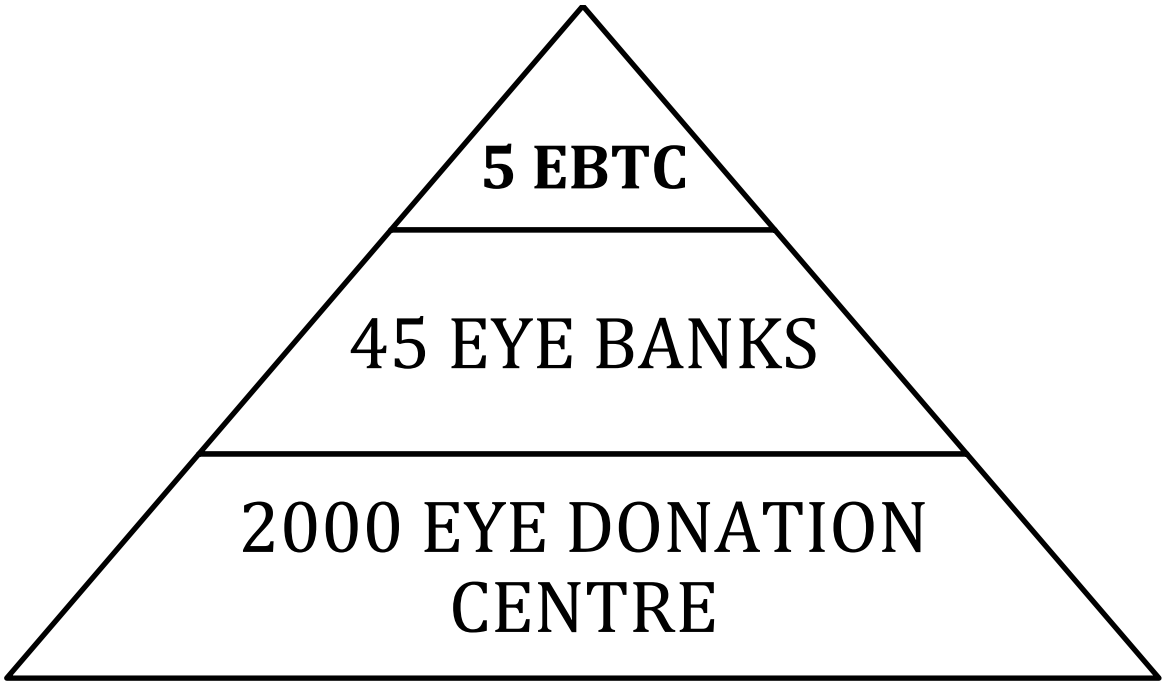


Figure: 1 3 Tier Eye Banking:

ETBC- Eye bank training center

The basic equation is

a) 50 eye banks and ETBC will network with 2000 eye donation centers
b) One Eye bank/ETBC for 2 crore population and linked with 40 eye donation center.
c) Each eye bank/ETBC will develop HCRP with 10 major hospitals.
d) Each eye bank/ETBC process 4000 corneas/year
e) Each eye donation center will harvest 50 eyes/year.

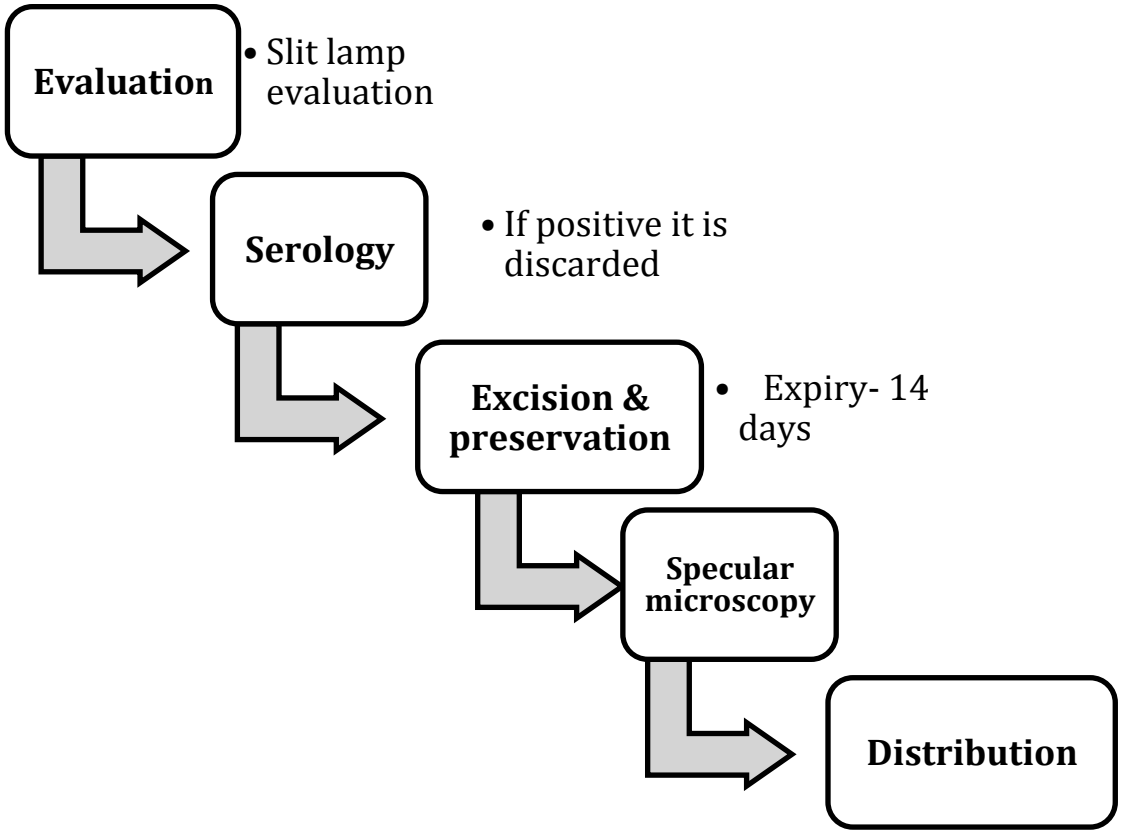


Figure 2: Tissue processing in Eye Bank

1.5 FACTORS INFLUENCING EYE DONATION

For corneal blindness, corneal transplantation with good quality corneal tissue is the mainstay of management. It depends on availability of suitable donors. For corneal donation cadaver donors are the only source. It is never an easy task to approach a family for consideration of donation eyes immediately after the death of their dear ones. It is one of the most difficult aspects of donation process.

The awareness of eye donation ranges from 28%- 80 % among general population. Such huge difference is attributed to high literacy rate among people with high awareness (17).

Education and occupation were found to be important factors associated with eye donation. Employed persons were found to be five times more aware than unemployed persons. They were more aware about the correct timing to donate the eyes. (17)

The various sources of information regarding eye donation are television, newspaper, publicity campaigns, radio etc.

Awareness about ideal time to donate the eye ranges from 4.3% to 53.2 %. (18). High awareness regarding the ideal time was seen among students, teachers, social workers and kins of family members who donated eye.

The Transplantation of Human Organ Act, 1994, states that "the person competent to give authority for the removal of any human organ from such dead body may authorize the removal of that human organ for therapeutic purposes of the deceased provided that he is satisfied that the deceased had not expressed, before his death, any objection to any of his human organs being used for therapeutic purposes after his death; or where he had granted an authority for the use of any of his human organs for therapeutic purposes after his death, such authority had not been revoked by him before his death."

Most difficult aspect of donation process is approaching a family for consideration of eye donation.

Reasons reported for unwillingness for eye donation are

a) Refusal to discuss the issue of donation,
b) Dissuasion by other relatives
c) Non availability of the person legally authorized to give consent
d) Religious beliefs
e) Fear of organ trafficking.

Measure to increase eye donation.

a) Publicity for eye donation
b) Identification of all potential donors
c) Effective co-ordination between eye donation counselors, doctors who declare death, eye bank staff, forensic medicine specialist, police and registration staff.

1.6 HOSPITAL CORNEA RETRIEVAL PROGRAM

There is a huge shortfall of donor corneas in India and approximately 2 million people are blind due to corneal disease. Voluntary donation and Hospital cornea retrieval programs (HCRP) are the two sources of corneas for Indian eye banks.

HCRP has an important role in Eye banking scenario in India. It helps in harvesting more number of donor corneas and at the same time we can have best quality tissue with maximum utilization for the benefit of corneal blind people. As a result of newer customized corneal lamellar procedures surgical and visual results have been improved dramatically.

HCRP was started in India in the year 1990 by LV Prasad Eye institute, Hyderabad. It can bridge the gap between demand and actually collected corneas (8). It is more effective system of corneal retrieval in terms of both collection and utilization (10)

HCRP focuses on hospitals to retrieve corneal tissue because of several inherent advantages like availability of medical history, availability of tissues from younger individuals, reduction in time interval between death and corneal excision [8], availability of well-versed staff round the clock, trained Eye Donation Counselors/Social workers can contact eye donor family for better counseling and

motivation and also collect donor medical information. All the previously mentioned studies suggests that hospital corneal retrieval is more effective with less effort, prior knowledge of eye donation is also not a prerequisite as the hospital staff can educate the relatives of the deceased. (10)

NPCB has stressed upon keeping a tab on the hospitals where mortality rate is high (at least 4 to 5 deaths per day). In the hospital that we have selected for our study, mortality rate is 2 to 3 per day ~~so~~ and hence the potential for corneal retrieval is high.

Choice of hospitals

An important step in the initiation of HCRP is identification of the hospitals to be included in the program.

Ideally the hospitals to be chosen are

- Large multispecialty hospitals with a high mortality rate (3 to 4 per day or more) >3000/year.
- Medium multispecialty hospitals with moderate mortality rate (of 1 to 2 per day or more)> 2000/year.

Link between the hospital and the eye bank

Role of the Director of the Eye Bank or equivalent designee

The Director of the Eye Bank initially meets the Hospital management and signs a memorandum of understanding. The eye bank Directors or equivalent committee members then meet the hospital authorities

(Administrators, Public Relations Officer, Medical Officer and Nurses) and educate them on the basics of eye banking and the HCRP.

They seek permission for the display of publicity materials and posters about eye donation in the wards and patient lounges in the hospitals.

The administrative and medical staff of the hospital is requested to cooperate well with the eye donation counselor (EDC), and provide information regarding the potential eye donor.

The eye bank Directors periodically meet the hospital authorities to make enquiries about the progress / problems encountered during counseling and to strengthen the bond between the eye bank and the hospital.

The eye bank Management makes arrangements for training the eye donation counselor on grief counseling techniques. The eye bank Directors periodically verifies the records of EDCs and advice the counselor on improving the counseling techniques.

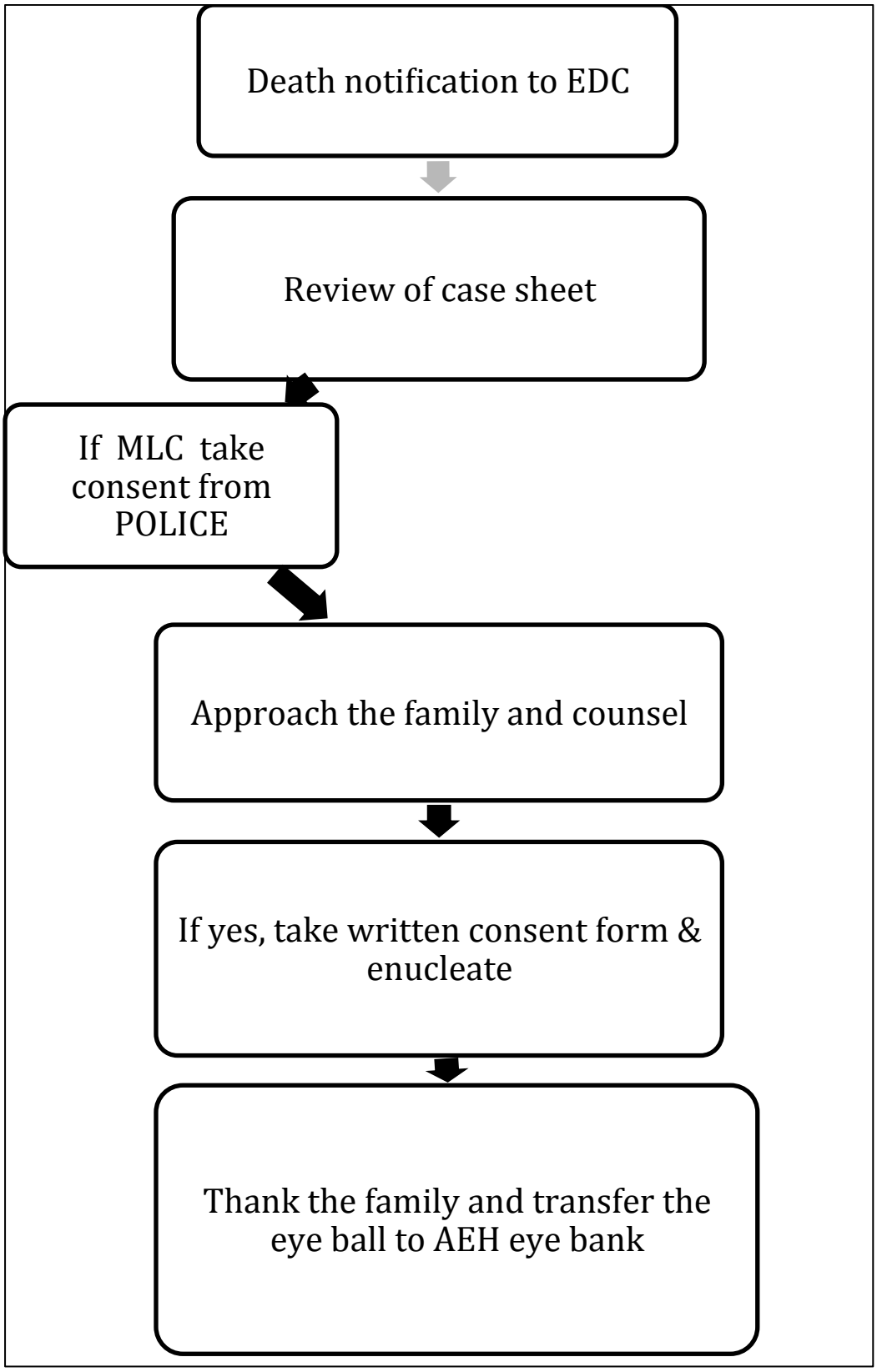


Figure 3: HCRP workflow

1.7 EYE DONATION COUNSELOR

Eye donation counselor (EDC) is the liaison between the donor family and the eye bank. The counselor's role is to make the family members aware of eye donation, motivate them and get their consent for eye donation. Eye donation counselor plays an integral part of Hospital cornea retrieval program. They are the backbone of HCRP. Voluntary Eye donation is a result of realization of one's social responsibility towards the corneal blind. However, in moments of grief, this realization may not materialize into actual eye donation, because the next-of-kin may not be in a position to make such emotional decisions. Eye Donation Counselors directly motivate the family members of the deceased for an eye donation. Round the clock there is at least one EDC in the hospital and they are informed when a death happens in the hospital (10).

According to module on "standards of eye banking in India, 2009" by National Programme for Control of Blindness [NPCB]

Attributes of an Eye Donation Counselor

The EDC will be initially told and taught the concept of eye banking through classes comprising of both theory and demonstration. They should be committed to the cause of eye donation. They are expected to have good communication skill and be well conversant with

EYE DONATION COUNSELOR COUNSELING THE FAMILY MEMBERS

regional language. They should dress professionally and wear white apron and an identity card during duty hours. They would be taught about Ocular anatomy, corneal anatomy and physiology, corneal blindness, corneal transplantation, Eye bank and its level of operation. They would be initially posted in eye bank for observation to get acquainted with functioning of eye bank.

Grief counseling techniques

The EDC should approach the family members of the deceased at an appropriate time. They should not counsel the family in a hurry and should wait until the family members are found mentally relaxed. They should first introduce themselves by name and the eye bank they belong to. They can talk to limited family members in an ideal surrounding and talk to those who are found supportive to the cause. They should provide comfort, moral support and sympathy to the family members while attempting to motivate them for an eye donation and respect the feelings of the family members. They should patiently listen to the family members and address the fears and queries raised by the family members. They must have adequate knowledge about the myths and facts about eye donation.

The EDC should be taught about the procedure to be followed in Medico-legal cases. It is important that they get written approval from the police personnel before alerting the eye bank. They should assure the family members that there would be no delay caused in making funeral

arrangements. It is important that they give adequate time for the family members to discuss and decide about eye donation.

They can only suggest eye donation to the family members and not force them to make an eye donation.

The EDC should express their gratitude to the family member upon obtaining consent and express gratitude to the family members of the deceased even in the absence of obtaining consent for eye donation. They can alert the eye bank soon after obtaining consent for eye donation and inform the eye bank team where exactly the body is placed so as to enable the team to reach the site without delay. They are expected to have a copy of the death certificate ready before the eye bank team reaches the site, as it is mandatory to have a death certificate prior to proceeding for corneal excision

Expression of gratitude

The EDC should express gratitude to the family members of the deceased after obtaining the consent for eye donation as well as after performing corneal excision.

Documentation

On a daily basis, the EDC must document relevant details of every case approached and motivated during the work period in the form designed for the purpose. The daily reports will be analyzed at the closure of every month and recorded.

1.8 EVALUATION OF DONOR CORNEA

The major functions of eye bank are potential donor screening, procurement, processing and preservation, evaluation and distribution

The aim of evaluation of donor tissue is to identify the suitability for surgery and to further group the suitable tissues for different types of keratoplasty technique so that there is maximum utilization of the donor tissue.

DONOR SCREENING:

Before collection of eye there are important steps to be followed

a) Identify donor and confirm death

b) Take written informed consent

c) Detailed ocular and medical history

d) Examine adnexa to look for signs of infection

Various techniques in collection of eye:

a) In situ corneoscleral rim excision

b) Whole globe enucleation with moist chamber storage

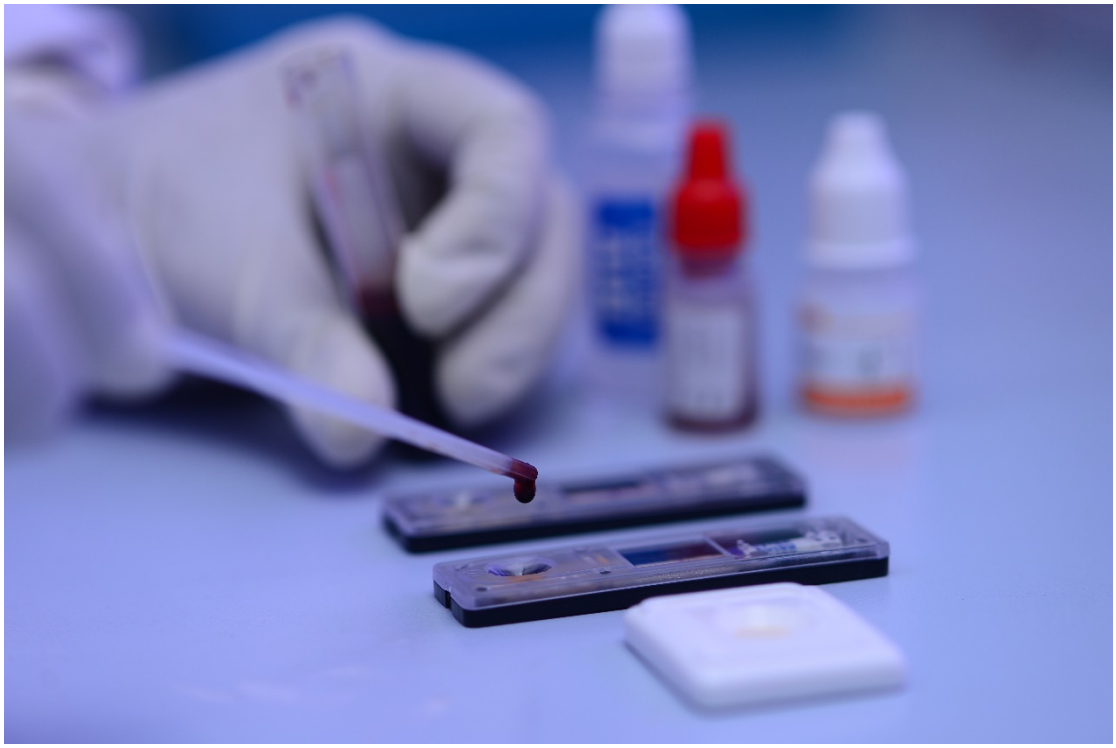
Advantages of in situ excision

a) More cosmetically acceptable

b) Decrease in death to storage time in moist chamber

c) Decrease in contact time between endothelium and toxic aqueous

SEROLOGY ANALYSIS OF THE DONOR



SLIT LAMP EVALUATION OF DONOR BUTTON

SPECULAR MICROSCOPY DONE IN DONOR BUTTON

EXCISION OF SCLERO CORNEAL BUTTON

Disadvantages:

a) If in slit lamp examination the tissue is not suitable then there is wastage of resources.

b) If unsuitable then it cannot be used for research and surgical training purpose

c) It needs experienced technicians to excise to avoid damage to the tissue

Pen torch evaluation

Gross examination of the cornea is done to reveal

- Epithelial dryness
- Abnormal corneal shape
- Corneal scars/infiltrates
- Arcus senilis
- Signs of conjunctivitis/discharge.

Slit lamp evaluation:

It gives more accurate description of the cornea. It is the most important step of quality control in eye bank. Transparent vials allow examination through the bottom. It is recommended to have a vial holder attached to the slit lamp.

First examine under low magnification with diffuse or wide slit beam at 45 degree followed by higher magnification to systematically study all the layers of cornea.

Look for epithelial defect, exposure and epithelial haze. In areas of epithelial defect look for bowman's layer injury. Stroma is examined in detail for opacities, infiltrates, deep stromal folds and edema. Descemet's membrane and Endothelial layer are looked for guttae, Descemet's tear, and stress lines.

In anterior chamber examine the aqueous, iris, lens status. Look for any signs of trauma.

The corneal tissue is labeled as excellent, very good, good, fair and not suitable for surgery.

Criteria:

EXCELLENT:

- No epithelial defects
- Crystal clear cornea
- No Arcus senilis
- Excellent endothelium

VERY GOOD:

- Slight epithelial haze
- Clear stroma

- Very slight Arcus
- Few DM folds
- Very good to excellent endothelium

GOOD:

- Obvious moderate epithelial defects
- Light-moderate cloudiness
- Moderate Arcus senilis
- Obvious folds
- Few vacuolated cells

FAIR:

- Obvious epithelial defects
- Moderate to heavy stromal cloudiness
- Heavy folds
- Heavy Arcus senilis
- Fair to good endothelium

POOR:

- Moderate vacuolated cells
- Severe stromal cloudiness
- Marked folds
- Fair endothelium

1.9 VARIOUS METHODS OF CORNEAL STORAGE

MOIST CHAMBER:

This is the simplest method of corneal storage and still it is one of the leading methods of storage in our country. Whole globe enucleation is done and is kept in an airtight glass bottle. It can store cornea up to 48 hrs. In 4 **°C** shorter the storage time better the surgical outcome.

ADVANTAGES:

1. Simple and inexpensive
2. Useful in developing countries without access to liquid storage media.

DISADVANTAGE:

1. Shorter storage time
2. Postmortem changes in aqueous like accumulation of waste metabolites; change in pH and ion concentration can affect the surgical outcome.

M-K MEDIUM:

The first liquid hypothermic storage medium. It is used for storing excised corneoscleral rim at 2-8 **°c** for 96 hours maximum.

MK medium consists of tissue culture medium TC-199 as base, with 5% dextran, HEPES and sodium bicarbonate as buffer. Phenol red as pH indicator and mixture of streptomycin and penicillin as antibiotics.

MOIST CHAMBER

OPTISOL MEDIUM

CORNISOL MEDIUM

LIFE $4^{O}C$

OPTISOL-GS:

Optisol is the most popular chondroitin sulphate based intermediate duration media. It can store cornea for maximum of 14 days.

Optisol contains TC-199, Earle's balanced salt solution and minimum essential medium as base component. The high concentration of CDS and dextran act together to give greater deturgescence to the stored tissue. Like MK medium HEPES and bicarbonate acts as buffering agents. Optisol contains additional components to increase endothelial viability. (48)

CORNISOL:

It is an indigenous intermediate hypothermic corneal storage medium which is approved for storing tissues for 14 days at 2-8 **°c.**

It is a chondroitin sulphate containing medium which combines the constituents of optisol GS and Life 4 **°c**.

LIFE 4 °C

It is a new FDA approved intermediate storage medium which is better than optisol GS for corneal preservation. Unlike other storage media it comes in 30 ml vials and there is specialized transport and viewing chamber available.

CRYOPRESERVATION:

It is only method that can theoretically store cornea indefinitely. This method is not popular because of its technical complexity because of freezing injury to cells. Refinements are being made like storing tissues in dimethyl sulfoxide, which is a cryoprotectant, or using vitrification, which is an ice-free method.

ORGAN CULTURE:

This method was first described by Doughman in 1972 where he demonstrated storage of tissues for 5 weeks at 34 **°c** with good endothelial function. The longer storage period allows screening for prion diseases and quarantining tissues for microbial contamination. However due to technical difficulty and high maintenance it is used only in European countries.

1.10 REVIEW OF LITERATURE

Kumar et al in the year 2012 conducted a retrospective study to identify potential donors from trauma related deaths and study the loss of opportunity for eye donation at different levels. Among 584 trauma related deaths during the study period, 1066 cases were identified as suitable for eye donation. 831 cases were identified as lost opportunity cases but they could not identify the exact reasons and speculate that possible reasons could be lack of notification and shortage of staff. Among 235 families approached only 20% gave consent for eye donation. Out of 1066 eligible trauma related deaths only 20(1.9%) were converted into successful eye donation. So they suggested strengthening the existing administrative and manpower resources to increase corneal retrieval rate. (1)

Gupta et al in the year 2015 conducted a population-based study to estimate the prevalence, causes of corneal morbidity and corneal blindness in rural population of India. Out of 12113 people examined prevalence of corneal disease was 3.7% and corneal blindness was 0.12%. This study showed higher prevalence of corneal disease among elderly. Pterygium, ocular trauma and infectious keratitis were the common causes of corneal opacity. Post-surgical bullous keratopathy (46.2%) and corneal degenerations (23.1%) were corneal diseases contributing to blindness. Vitamin A deficiency and trachoma was low among the study population. (2)

Moraine et al in the year 2002 conducted a retrospective study to analyze the various obstacles to cornea postmortem procurement. Among 1112 deaths they were able to identify 451 records, which included 329 patients, aged between 18 and 85 and excluded 184 patients due to medical contraindications. The coordinating nurses were able to meet the relatives of only 55 out of 145 patients and obtained consent in 39 cases. Relatives' refusal accounted to only 5.5% of cases. Corneal retrieval was 11.8% of identified records and 3.5% of total deaths. This study concluded that relatives refusal is no longer the cause of donation shortage but it is due to logistical difficulties like identifying potential donors and reaching relatives and suggested to strengthen the coordinating team. (3)

Krieg stein et al in the year 2002 conducted a prospective non-comparative study to study the factors influencing the consent rate of corneal donation among the relatives. Out of 264 possible donors 214 relatives were approached and 144 gave consent to corneal donation. Higher consent rate was observed among relatives with a university degree (72%) and urban population (67%). So this study concluded that knowledge regarding sociological factors will lead to better understanding and improved interviews and in turn increase the consent rate. (4)

Barboza et al in the year 2007 conducted a study to increase the number of corneas available for transplantation by initiating a project by appointing a hospital transplantation coordinator who trained the morgue staff to identify the potential donors and inform the coordinator to approach the family. They identified that there was major increase in number of donations (220 per year) and 70% of the donors were patients who had died due to cardiac arrest. They concluded that this model is efficient and to be implemented in other hospitals to decrease the waiting time for cornea transplant. (5)

Salim et al in the year 2007 conducted a retrospective study to review the effect of the presence of an in-house coordinators (IHC) on organ donation rate. Data concerning organ donation demography and family consent rates were compared before (Pre-IHC) and after (post-IHC) implementing an IHC program. The function of IHC was to assist in donor surveillance, provide hospital staff education, assist with family consent and donor management and provide family support. They observed significantly higher consent rate and conversion rate and 17% increase in organ donation. They concluded that IHC program should be implemented to bridge the gap between organ supply and organ demand. (6)

Sangwan et al in their article "Eye banking in India: a road ahead" proposed a three tier structure for all the activities of eye banking. Eye bank, eye bank training center and eye donation center are the three tiers. They envisaged an eye bank for every 20 million people and each eye bank should be linked with 40 eye donation centers. Five eye banks should serve as eye bank training centers. Each eye bank should develop a hospital cornea retrieval program (HCRP) in 10 major hospitals. 50% of harvested corneas should be from HCRP. (7)

Venugopal et al in the year 2015 conducted a cross sectional, retrospective record based study to estimate the potential for hospital based retrieval of donor corneal tissue after analyzing the contraindicated and indicated cause of deaths. They identified that out of 855 deaths corneas could be retrieved from 736 deaths. Major cause of contraindications was death due to septicemia, meningitis, encephalitis and HIV seropositivity. Number of males (565) was greater than females (290). They concluded that hospital corneas retrieval program can bridge the gap between the need for the cornea and actually collected cornea and make a huge difference in eliminating corneal blindness and advantages would be availability of medical history, younger donor tissues and reduction in death to enucleation time. (8)

Olivia et al in their article “turning the tide of corneal blindness” reported that corneal diseases are the second leading cause of blindness in developing countries. Increase in cataract surgical rates and improvement of eye care infrastructure provides a platform to dramatically improve corneal transplantation rate. Eye bank infrastructure should follow suit. They recommend the development of professional eye bank managers and hospital cornea recovery programs and these changes will increase the corneal retrieval rates, improve utilization rates, operating efficiency realization and self-sustainability. (9)

Bakshi et al in the year 2017 conducted a retrospective study to compare the data in terms of collection and utilization between voluntary eye donation (VED) and Hospital cornea retrieval program (HCRP). Total cornea retrieval was 2444 and through HCRP was 1698. Utilization by VED was 42.63% and by HCRP was 54.24%. The total number of therapeutic keratoplasty was 185 and the total number of optical keratoplasty was 127 in VED group. In HCRP group the total number of therapeutic keratoplasty was 168 and total number of optical keratoplasty was 653. It concluded that HCRP is a better and much more effective system in procuring cornea tissue in terms of both collection and utilization but community based VED should continue. (10)

Cunningham et al in the year 2012 conducted a study to evaluate the trends in the acquisition, storage, and utilization of donor corneal tissue in New Zealand, 2000-2009. Out of 1268 donors 64% were male and 36% were female. Median age for the donor was 67%. The median death to preservation interval was 18.5 hours and no relationship was identified between cornea suitability for transplantation and death to preservation interval. Microbial contamination rate was 1%. Serology for HIV, hepatitis B, or hepatitis C was positive for 4% of cases. The utilization of corneas for transplantation was 88%. There was an association between male sex and lower endothelial count. (11)

Tendon et al in the year 2004 conducted a prospective study to evaluate the factors affecting eye donation from post mortem cases in a tertiary care hospital. Out of 721 post mortem cases 159 were identified as potential donors. 66 families were willing to donate eyes and 93 families refused. Prior knowledge of eye donation, literacy and socio economic status did not have any influence on willingness for eye donation. Refusal to discuss the issue, dissuasion by distant relatives, legal problems and religious beliefs were the major reasons for not donating. So it concluded by saying that active counseling by a motivated team can be effective even in families with no prior knowledge and low socioeconomic status. (12)

Patel et al in the year 2005 conducted a prospective longitudinal study to analyze donor demographics and source, donor tissue processing and storage, biologic contamination and the utilization and distribution of corneal tissue procured by the New Zealand national eye bank. Among 1628 donors 69.8% were male and 30.2% were female. No significant correlation was identified between donor age group and proportion of suitability of cornea for transplantation. 67.6% of donors were procured from coroner's service and 23.5% from public hospitals and 7.1% from multi organ donor. Cardiovascular death, trauma and cerebrovascular disease were the most common causes of donor deaths. 79.4 % of corneal tissues procured were utilized for corneal transplantation. (13)

Gillon et al in the year 2012 conducted a questionnaire-based study to understand the attitude, knowledge, practice and experience of corneal donation from hospice staff that are in direct contact with clinical patients. Questionnaire was given to 704 staff and 434 were received back. Most participants believed that corneal donation is a rewarding opportunity and patient and family members should be aware of it, but 90% never raised the topic and only 33% felt that it is part of their role. The belief that they lack the knowledge, negative experiences of corneal donation, concern about the impact of the discussion, low levels of training were stated as key reasons for not engaging in discussions about corneal donation with the family.

2.1 AIM

To study the efficacy of hospital cornea retrieval program (HCRP) at Aravind eye hospitals. Madurai.

Primary Objective:

- To study and compare the demography, quality of tissue and utilization of cornea tissues obtained from HCRP and Home retrieval.

Secondary objective:

- To determine long term benefits by conducting 6 month post operative follow up on patients who underwent optical keratoplasty with donor corneas from HCRP.

HYPOTHESIS:

Null hypothesis: There is no difference in quality of cornea tissue between HCRP and home retrieval.

Alternate hypothesis: There is difference between quality of cornea tissue between HCRP and home retrieval.

METHODOLOGY:

The study protocol is in accordance with the declaration of Helsinki.

STUDY DESIGN: This is a hospital based Prospective non-randomized observational study conducted at Aravind eye hospital Madurai.

STUDY POPULATION: Donor corneas obtained from HCRP and Home retrieval at The Rotary Aravind International Eye Bank affiliated to Aravind Eye Hospital, Madurai.

Patients who underwent optical keratoplasty with the donor corneas through HCRP program from 1.01.2016 – 31.03.2016.

STUDY PERIOD: Data of donor corneas collected for duration of one year that is from 1st of December 2015 to 30th of November 2016.

Patients undergoing keratoplasty with donor cornea obtained through HCRP between 1st January 2016 and 31st march 2016 and followed up for 6 months.

SAMPLING TECHNIQUE: Non-probable sampling.

INCLUSION CRITERIA:

1. All the corneas that are retrieved through Hospital cornea retrieval program and home retrieval during the study period
2. Patients who underwent optical keratoplasty with the donor corneas through HCRP program from 1.01.2016 – 31.03.2016 & under regular follow up

EXCLUSION CRITERIA:

1. Patients who did not give consent to participate in the study.
2. Patients who underwent corneal transplants other than optical keratoplasty like patch graft, DALK or therapeutic keratoplasty
3. Patients who underwent optical keratoplasty with donor corneas obtained through Home retrieval

INFORMED CONSENT:

An informed consent was taken from the patients, explaining the procedure and the outcome of the surgery in detail including the possibility of the various complications in his or her own language. Patients were informed about the frequent follow-ups involved in the study

Consent for participating in the study was also taken and adhered to the tenets of the Helsinki declaration.

2.2 METHODOLOGY: This is a hospital based observational study. The Rotary Aravind International Eye Bank affiliated to Aravind Eye Hospital, Madurai, obtained donor corneas through HCRP and Home retrieval.

From 1st of December 2015 to 30th of November 2016 and patients who underwent optical keratoplasty with the donor corneas through HCRP program from 1.01.2016 – 31.03.2016 were included in the study. All the data were collected on a standardized proforma.

After the enucleated eyeball reaches the eye bank details about the donor such as age, sex, cause of death, death to enucleation time is noted on the proforma. The eyeball is examined by the cornea consultant and based on the quality of the tissue it is graded into excellent, very good, good, fair and not suitable for surgery. The eyeball, which is, graded as excellent or very good or good is excised under aseptic precautions in laminar airflow and corneal button is stored in cornisol medium after the blood sample has been tested for HIV, HbsAg and VDRL. The eyeball that is categorized into fair or not suitable for surgery is used for training and research purpose. After excising the corneal button, specular evaluation and slit lamp evaluation is done and it is utilized for various keratoplasty based on the quality of the tissue. These details are noted in the proforma.

To analyze the long term benefits of HCRP we conducted 6 months follow up on patients who underwent optical keratoplasty with donor corneas from HCRP. Pre op (UCVA) uncorrected visual acuity, BCVA IOP measurements and slit lamp examination were done. Patients were followed up at 1 month, 3 month and 6 months post op and the data was collected on a standardized proforma.

DATA COLLECTION TECHNIQUE AND TOOLS

All the data from the primary source was collected by an individual interview, observation, and complete ophthalmic examination of the subjects as per the present proforma and any additional information like complication and its management was mentioned in detail. Later these primary data was entered in a Microsoft excel sheet for a complete database. Data was also collected from secondary sources like PubMed, Medline and various journals for comparison with the primary data.

STATISTICAL METHODS

Mean (SD) and Frequency (percentage) was used for continuous and categorical variables respectively. Fisher's exact test or chi-square test was used to assess the difference between the categorical variable. Student t-test or Mann-Whitney U test was used to test mean difference between the two continuous variables. P-value of less than 0.05 was considered as statistically significant. All statistical analysis was done by statistical software STATA 11.0.

2.3 RESULTS:

A total of 493 eyes were included in the study out of which 303 belonged to HCRP and 190 to Home Retrieval as per study protocol to study and compare the demography, quality of tissue and utilization of cornea tissues obtained from HCRP and Home retrieval.

Chart 1: Distribution of donor corneas

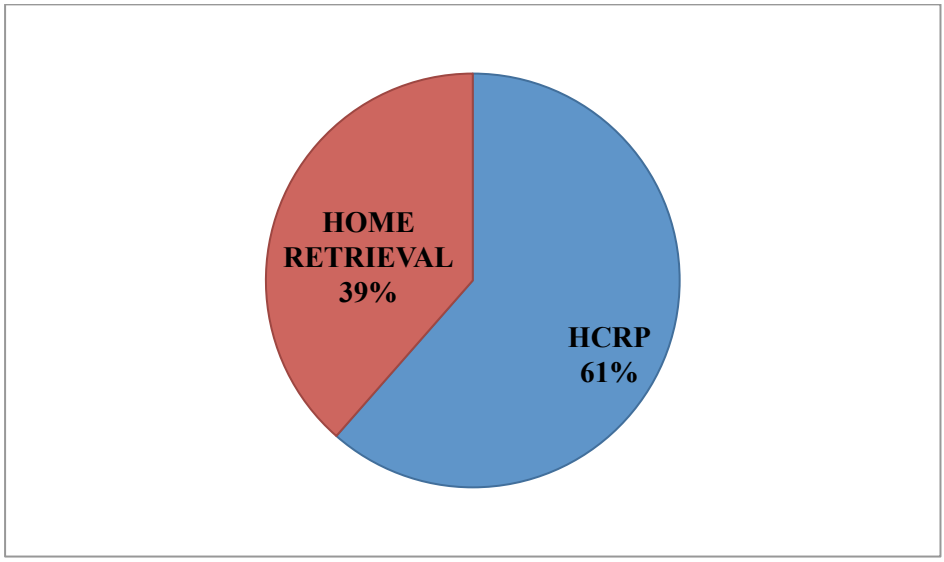


Table 1: Distribution of donor corneas

Group	N	%
HCRP	303	61.5
Home retrieval	190	38.5
Total	493	100

AGE:

Mean age of the donors of HCRP was 43.87 years. Mean age of donors in home retrieval group was 72.81 years. The age distribution in both groups had statistically significant difference (p value of <0.001).

Table 2: Mean age in HCRP and Home retrieval

AGE (in years)	**HCRP (*n=303*)**	**Home retrieval (*n=190*)**	**Total (*n=493*)**	**P-value**
Mean (SD)	43.87(19.0)	72.81(13.0)	55.02(22.0)	<0.001[+]
Min - Max	1 - 92	29 - 101	1 - 101	

*student t-test

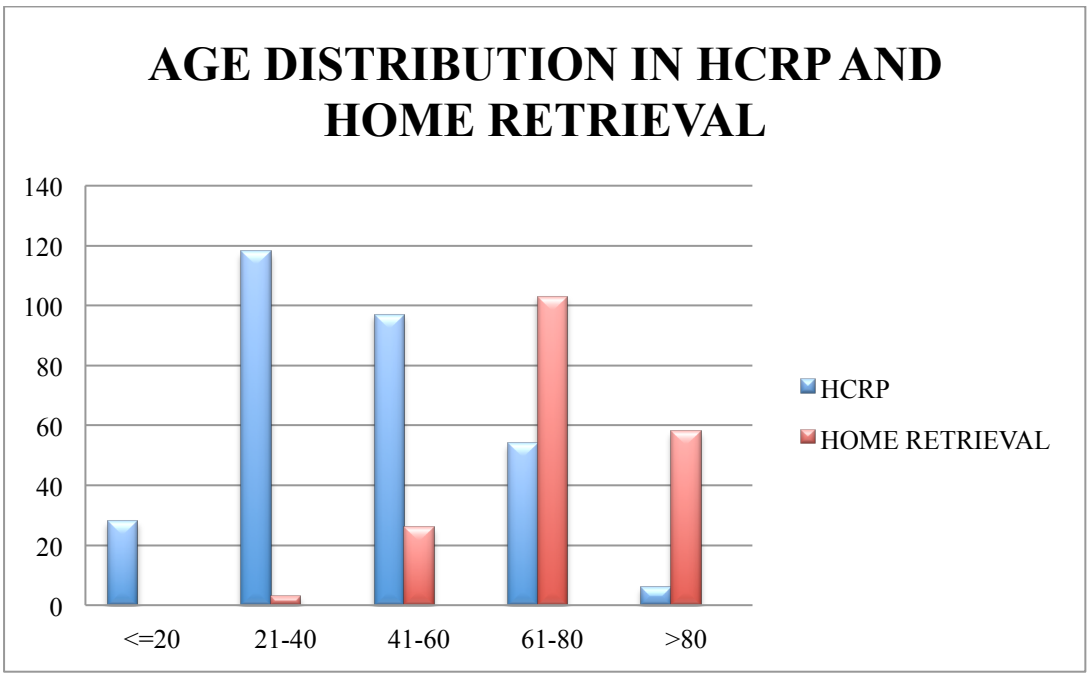
AGE DISTRIBUTION:

We found that nearly 48.1% of donors in HCRP group were less than 40 years of age whereas in home retrieval 84.7% of donors were more than 60 years of age.

Table 3: Age distribution in HCRP and Home Retrieval

Age	HCRP	Home retrieval	Total
<=20	28(9.2)	-	28(5.7)
21 – 40	118(38.9)	3(1.6)	121(24.5)
41 – 60	97(32.0)	26(13.7)	123(25.0)
61 – 80	54(17.8)	103(54.2)	157(31.9)
>80	6(2.0)	58(30.5)	64(13.0)
Total	**303**	**190**	**493**

Chart 2: Age distribution in HCRP and Home Retrieval



GENDER DISTRIBUTION:

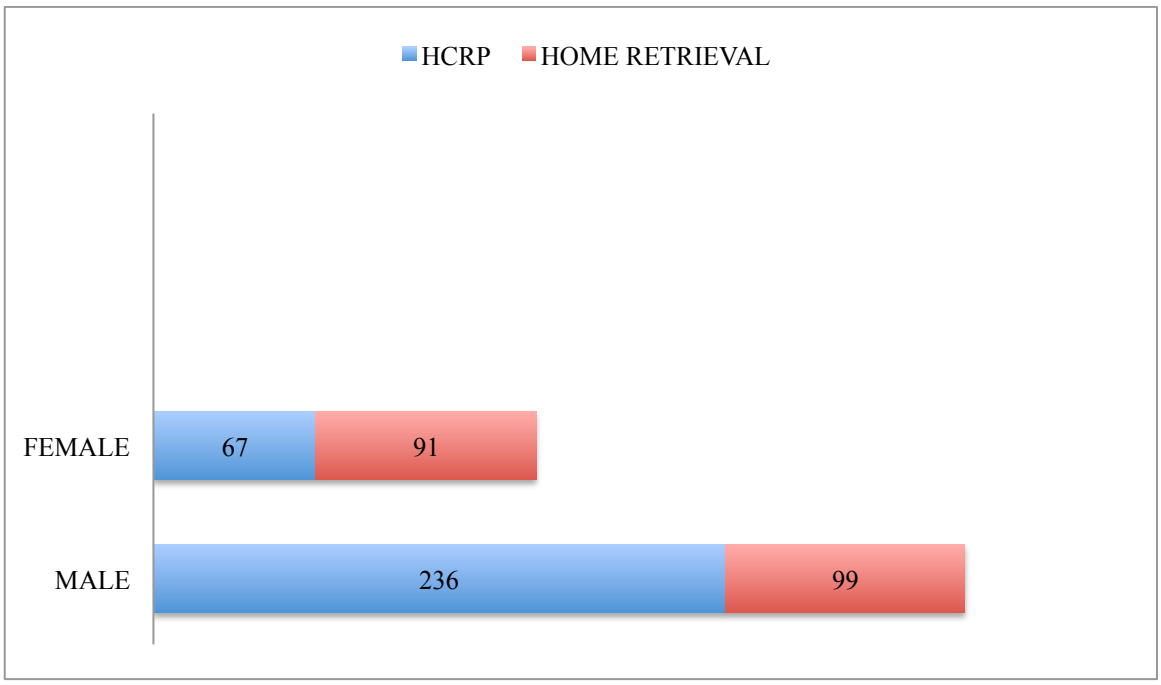
Out of 493 donors 335 were males and 158 were females. In HCRP group 236 were males and 67 were females. In home retrieval 99 were males and 91 were females. A male preponderance was noted in HCRP group, which was statistically significant

Table 4: Gender Distribution

Gender	HCRP	HOME RETRIEVAL	TOTAL	P VALUE
Male	236(77.6)	99(52.1)	334(67.7)	<0.001++
Female	67(22.1)	91(47.9)	158(32.1)	

++***Fisher's exact test***

Chart 3: Gender distribution



CAUSE OF DEATH:

Most common cause of death in HCRP group was Road traffic accident (132) followed by Organophosphates poisoning (41) and heart diseases (33). In Home retrieval group heart disease (93) and respiratory disease (47) were most common causes of death.

Table 5: Cause of death in HCRP and Home retrieval

Cause of death	HCRP	Home retrieval	Total
Cancer	4(1.3)	2(1.1)	6(1.2)
Heart disease	33(10.9)	93(49.0)	126(25.6)
CVA	27(8.9)	23(12.1)	50(10.1)
Respiratory disease	9(3.0)	47(24.7)	56(11.4)
RTA	132(43.6)	3(1.6)	135(27.4)
Others	98(32.3)	22(11.6)	120(24.3)
Cellulitis	*1(1.0)*	-	1*(0.8)*
CKD	*9(9.2)*	*18(81.8)*	*27(22.5)*
Electric shock	*5(5.1)*	-	*5(4.2)*
Hanging	*25(25.5)*	-	*25(20.8)*
OPC poisoning	*41(41.8)*	-	*41(34.2)*
Poisoning	*14(14.3)*	-	*14(11.7)*
Rat poison	*2(2.0)*	-	*2(1.7)*
Sepsis	-	*4(18.2)*	*4(3.3)*
Snake bite	*1(1.0)*	-	*1(0.8)*
Total	303	190	493

Chart 4: Causes of death in HCRP

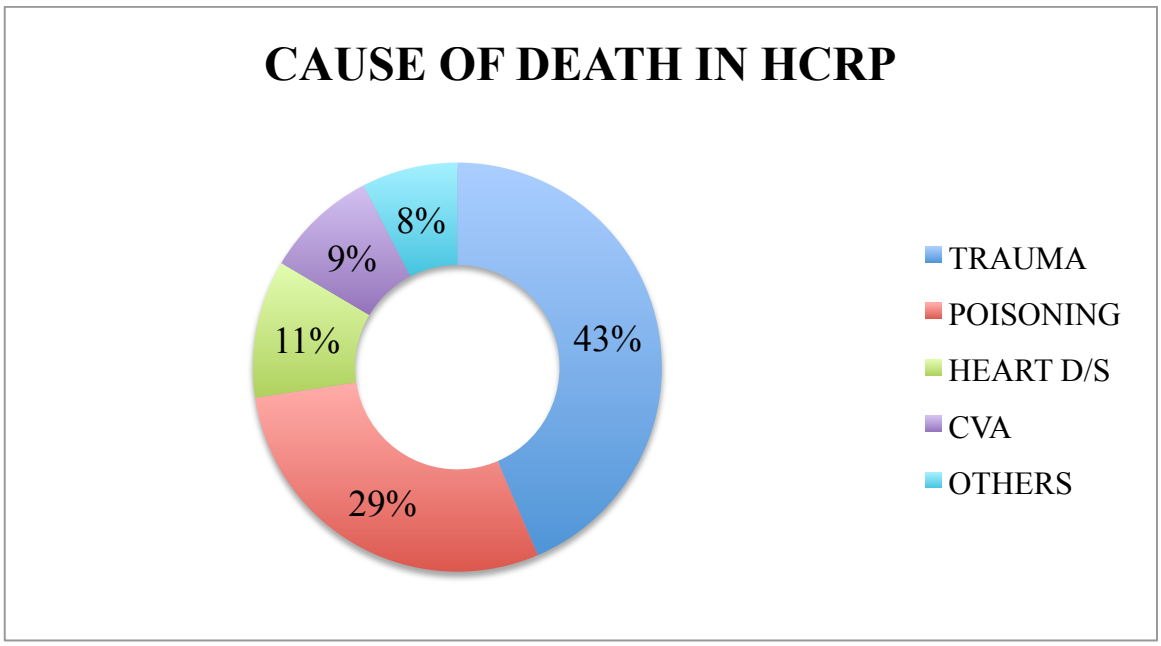
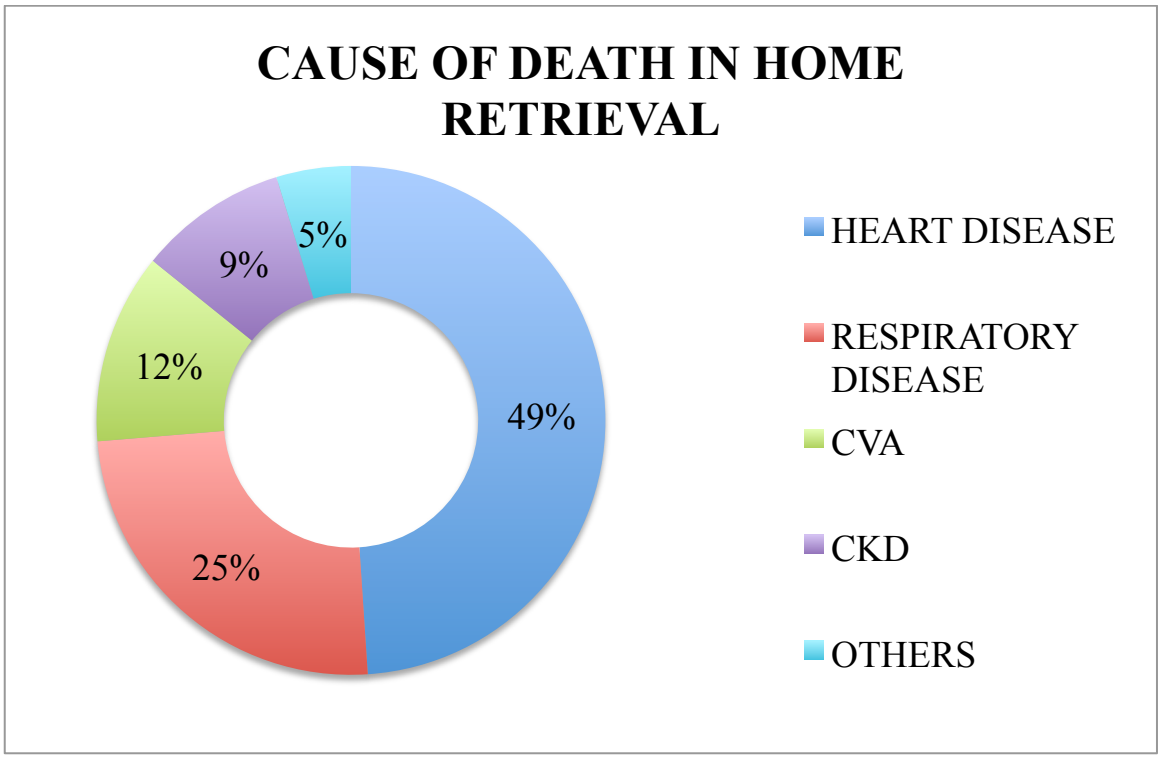


Chart 5: Causes of death in Home retrieval



MEDICOLEGAL CASES:

Among 303 donors in HCRP 222 donors belong to medico legal cases and only 2 donors come under medico legal cases in Home Retrieval. Most common cause of MLC is Road traffic accident followed by suicide.

Table 6: Medico legal cases in HCRP and Home retrieval

MLC	HCRP	Home retrieval	Total
Yes	222(73.3)	2(1)	224(45.5)
No	81(26.7)	188(99)	268(54.5)
Total	**303**	**190**	**493**

Table 7: Cause of medico legal cases

MLC Cause	N	%
RTA	12	58.7
Suicide	85	38.1
Accidental fall	1	0.5
Electric shock	4	1.7
Snake bite	1	0.5
Others	1	0.5
Total	**224**	**100**

Chart 6: MLC status in HCRP

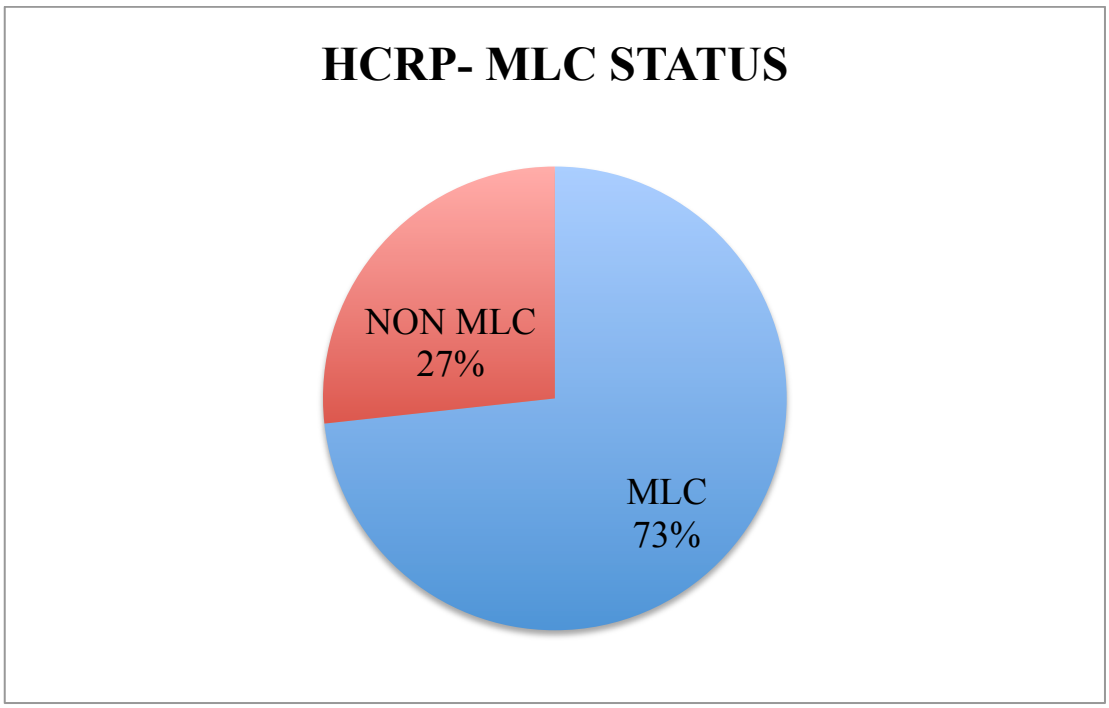
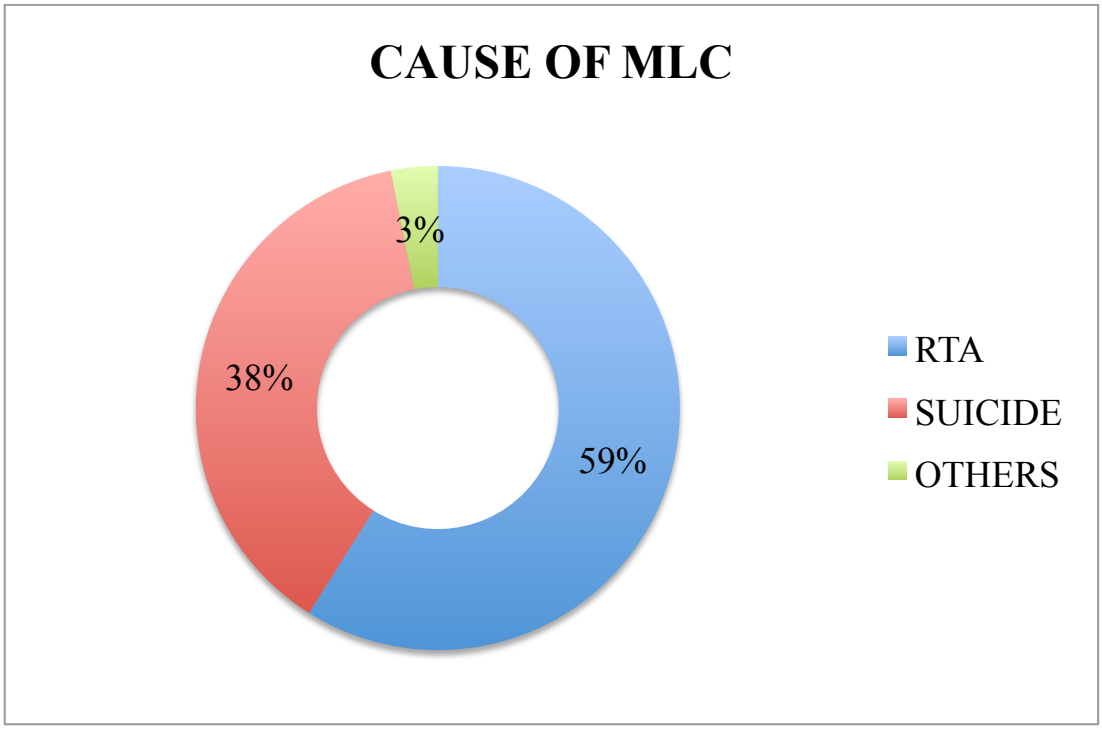


Chart 7: Causes of MLC



LENS STATUS:

Out of 986 eyes 745 eyes were phakic and 241 eyes were pseudophakic. In HCRP group 561 eyes were phakic and 45 eyes were pseudophakic. In home retrieval group 184 eyes were phakic and 196 eyes were pseudophakic. In HCRP group 92.6% of eyes were phakic.

Table 8: lens status of donor eyes

Lens status	Total (%)
Phakic	745(75.6)
Pseudophakic	241(24.4)
Total	986

Table 9: lens status in HCRP and Home retrieval

Lens status	HCRP (%)	Home retrieval (%)	Total (%)
Phakic	561(92.6)	184(48.4)	745(75.6)
Pseudophakic	45(7.4)	196(51.6)	241(24.4)
Total	606	380	986

Chart 8: Lens status in donor eyes

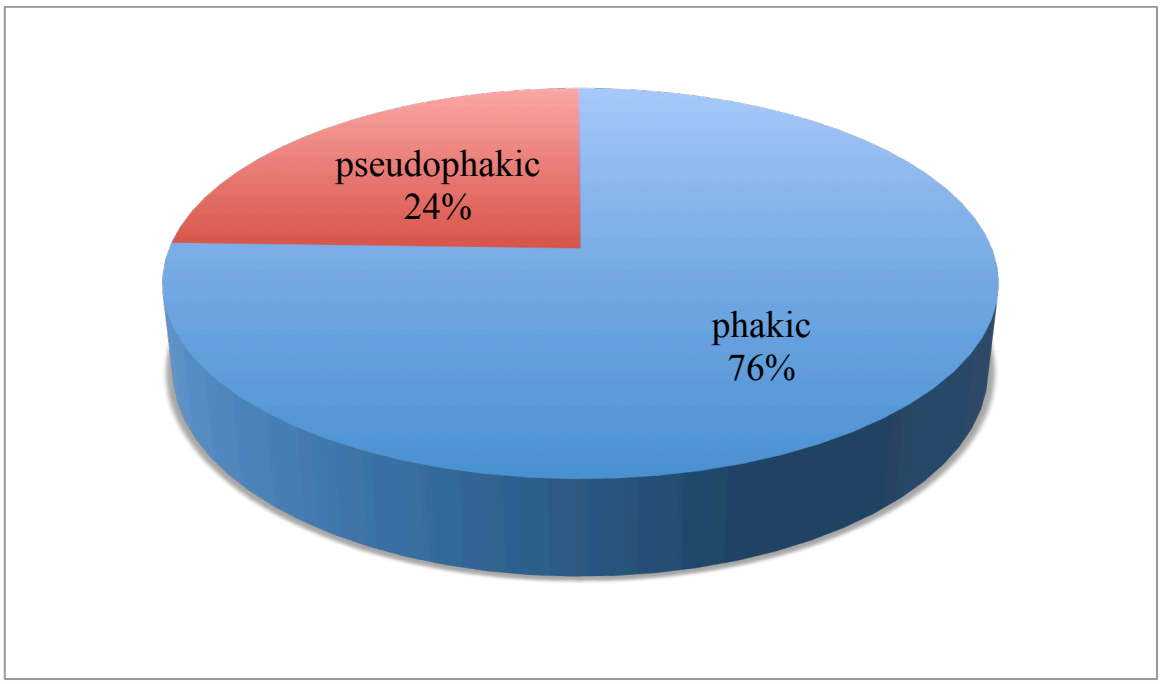
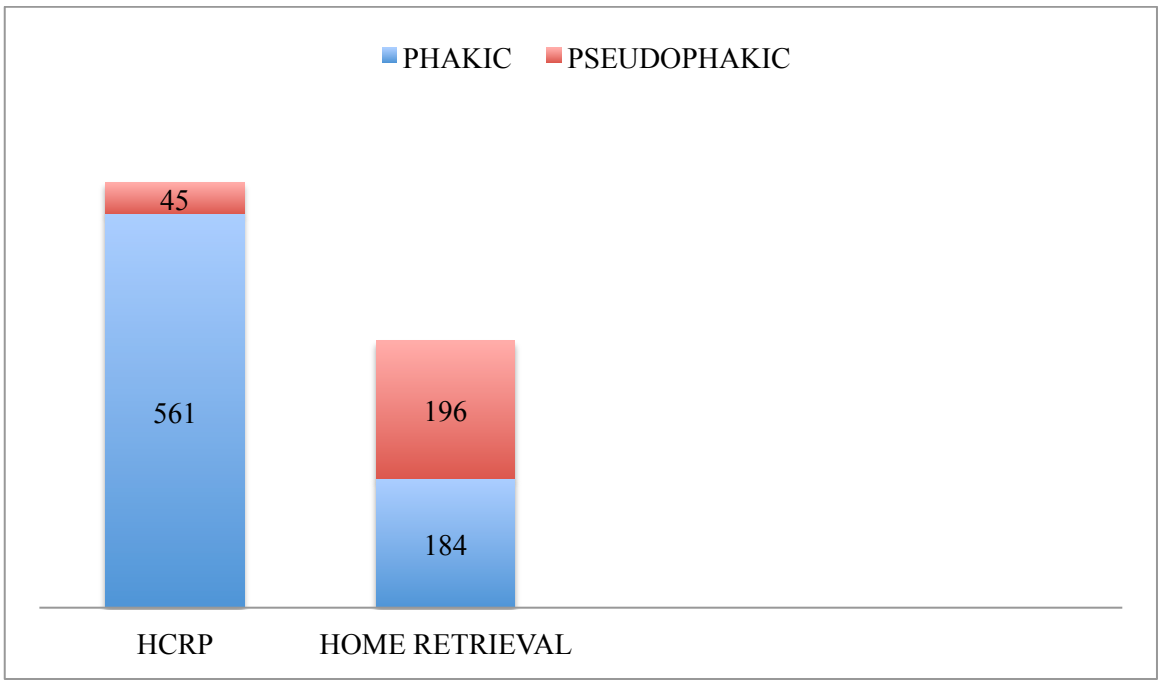


Chart 9: Lens status in HCRP and Home Retrieval



SLIT LAMP GRADING OF DONOR EYES. :

The donor eyes were graded into Excellent, Very good, Good, Fair and Not suitable of surgery based on slit lamp evaluation. Most of the eyes in HCRP belonged to Good (49.5%) and Very Good (18%). In Home retrieval group eyes belonged to Good (36.4%) and not suitable for surgery (27.8%).

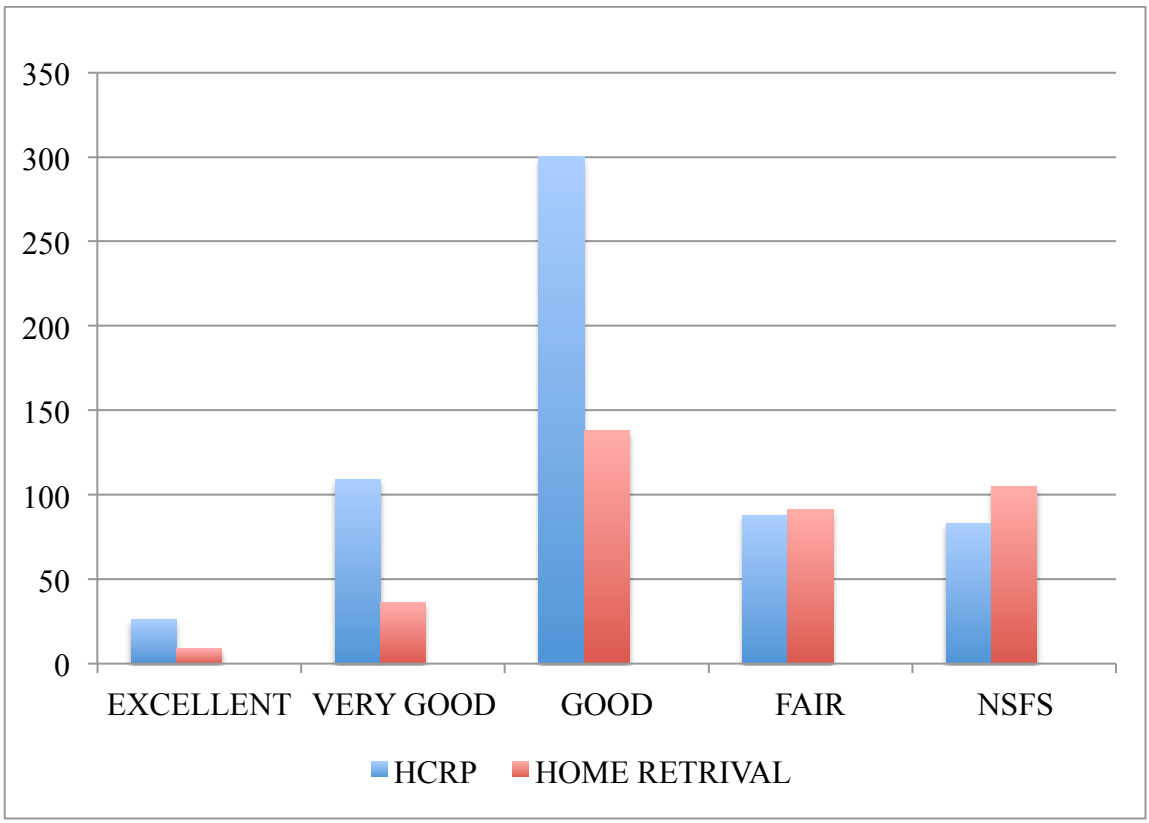
Table 10: slit lamp grading of donor eyes.

Slit lamp grading	Total
Excellent	35(3.5)
Very good	145(14.7)
Good	438(44.4)
Fair	179(18.2)
Not suitable for surgery	189(19.2)
Total	**986**

Table 11: Slit lamp grading of donor eyes of HCRP and Home Retrieval

Slit lamp	HCRP	Home retrieval	Total
Excellent	26(4.3)	9(2.4)	35(3.5)
Very good	109(18.0)	36(9.5)	145(14.7)
Good	300(49.5)	138(36.4)	438(44.4)
Fair	88(14.5)	91(24.0)	179(18.2)
Not suitable for surgery	83(13.7)	106(27.7)	189(19.2)
Total	**606**	**380**	**986**

Chart 10: Slit lamp grading of donor eyes and HCRP



SPECULAR MICROSCOPE:

Specular microscopy was done for donor eyes that came as Excellent, Very Good and Good under slit lamp grading. The mean specular count of eyes under HCRP was 2,931.48 and Home retrieval was 2668.66.

Table 12: Specular count of donor eyes of HCRP and Home retrieval

Specular microscope	n	Mean (SD)	Min – Max
HCRP	396	2,931.48(431.12)	1,406 – 5,208
Home retrieval	129	2,668.66(381.17)	1,166 - 3,514
Total	**525**	**2,866.90(434.08)**	**1,166 – 5,208**

UTILIZATION OF HCRP AND HOME RETRIEVAL:

Out of 986 donor eyes, 682 eyes were utilized for surgeries out of which 481 eyes belonged to HCRP and 201 to home retrieval.

Table 13: Utilization of HCRP and Home retrieval

Utilization	HCRP (%)	Home retrieval (%)	Total (%)	P-value
Yes	481(79.4)	201(52.9)	682(69.2)	<0.001^{++}
No	125(20.6)	179(47.1)	304(30.8)	
Total	**606**	**380**	**986**	**-**

$^{++}$***Chi-Squared test***

Chi-square test is used to find out the association between categorical variables. The p-value (<0.001) shows that there is an association between Utilization and HCRP, Home retrieval group.

Chart 11: Utilization of HCRP

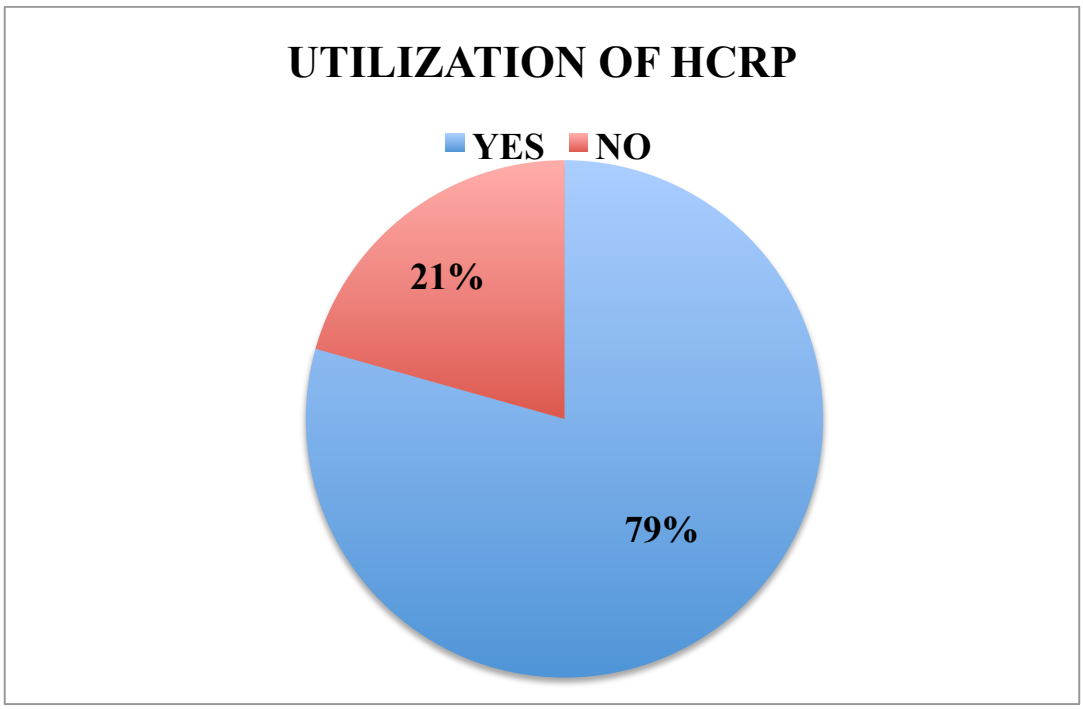
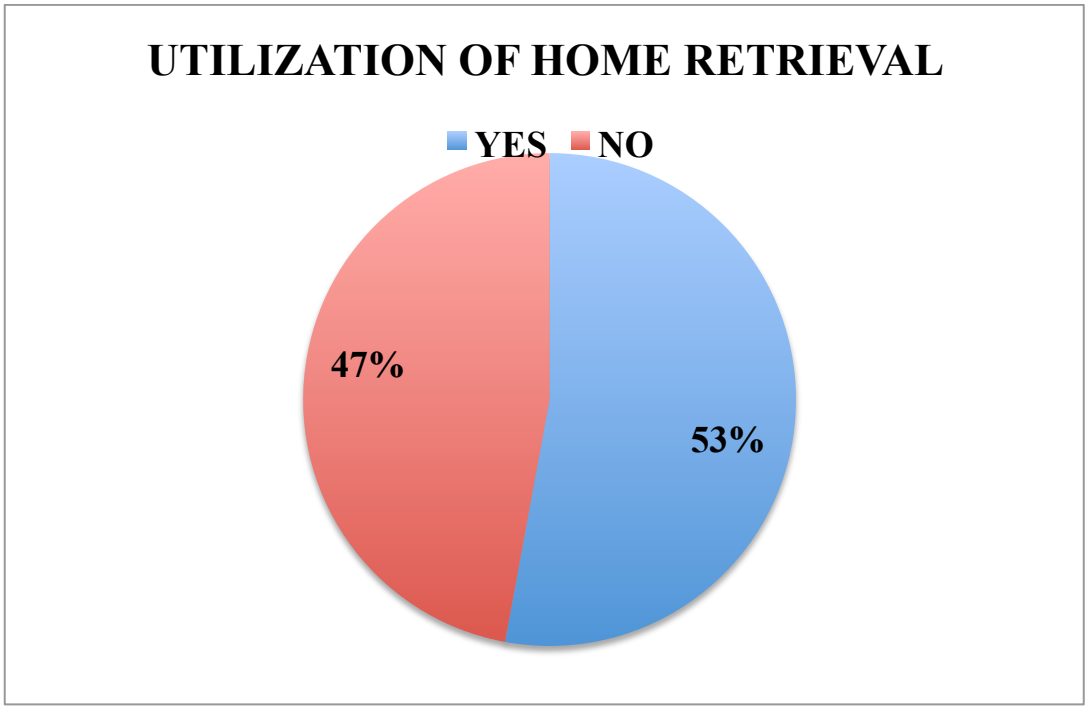


Chart 12: Utilization of Home Retrieval



DISTRIBUTION OF CORNEAS IN HCRP AND HOME RETRIEVAL:

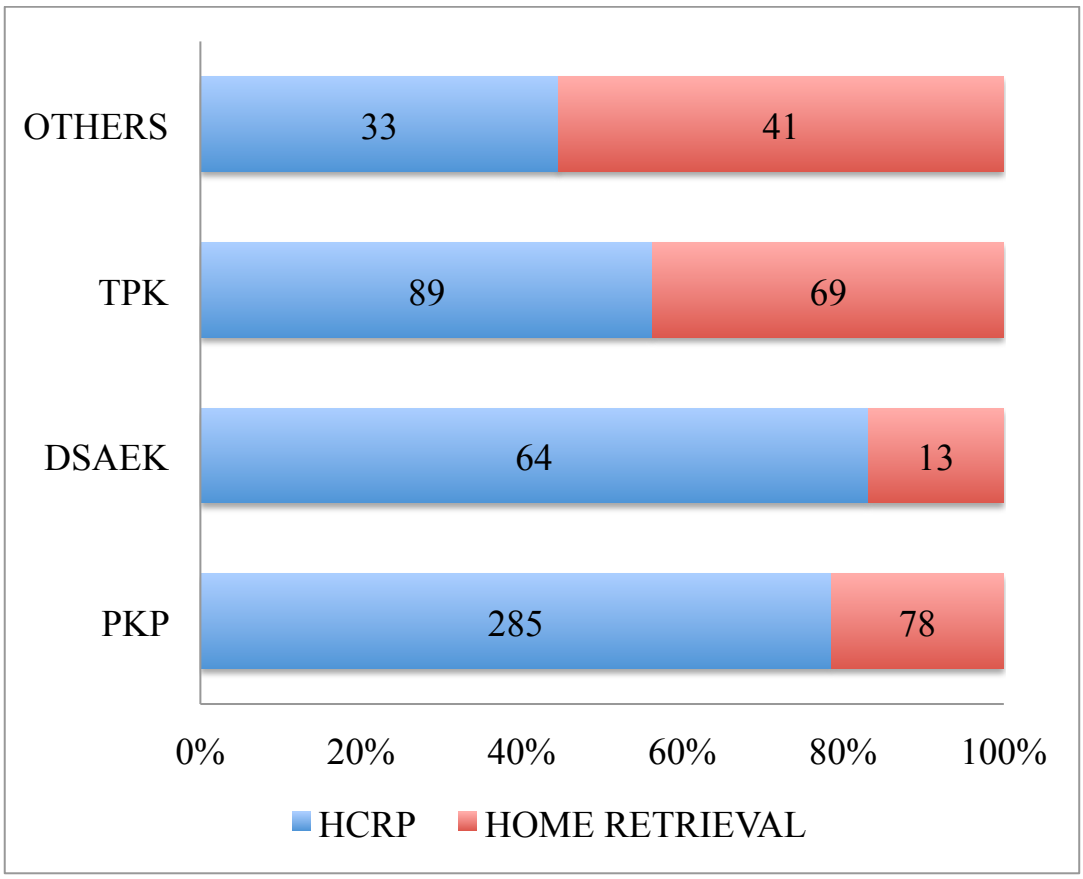
Out of 682 donor eyes 363 eyes were distributed to PKP in which 285 eyes belong to HCRP and 78 to Home retrieval.

77 eyes were utilized for DSAEK among which 64 eyes were contributed by HCRP.

Table 14: Distribution of donor eyes in HCRP and Home Retrieval

Utilization	HCRP	Home retrieval	Total
PKP	285(78.5)	78(21.5)	363
DSAEK	64(83.1)	13(16.9)	77
TPK	89(56.3)	69(43.7)	158
DALK	10(45.5)	12(54.6)	22
Patch graft	30(53.6)	26(46.4)	56
DMEK	1(50.0)	1(50.0)	2
Others	2(50.0)	2(50.0)	4
Total	**481(70.5)**	**201(29.5)**	**682**

Chart 13: Distribution of donor eyes in HCRP and Home Retrieval



DEATH TO ENUCLEATION TIME:

The death to enucleation time indicates the time between the death and the time of enucleation. The mean time for HCRP was 201 minutes and for home retrieval was 184 minutes.

Table 15: Death to Enucleation time

Enucleation time	n	Median	Mean (SD)	Min – Max
HCRP	303	210	201.20(95.93)	10 – 480
Home retrieval	190	180	184.84(78.00)	30 – 360
Total	**493**	**180**	**194.90(89.72)**	**10 – 480**

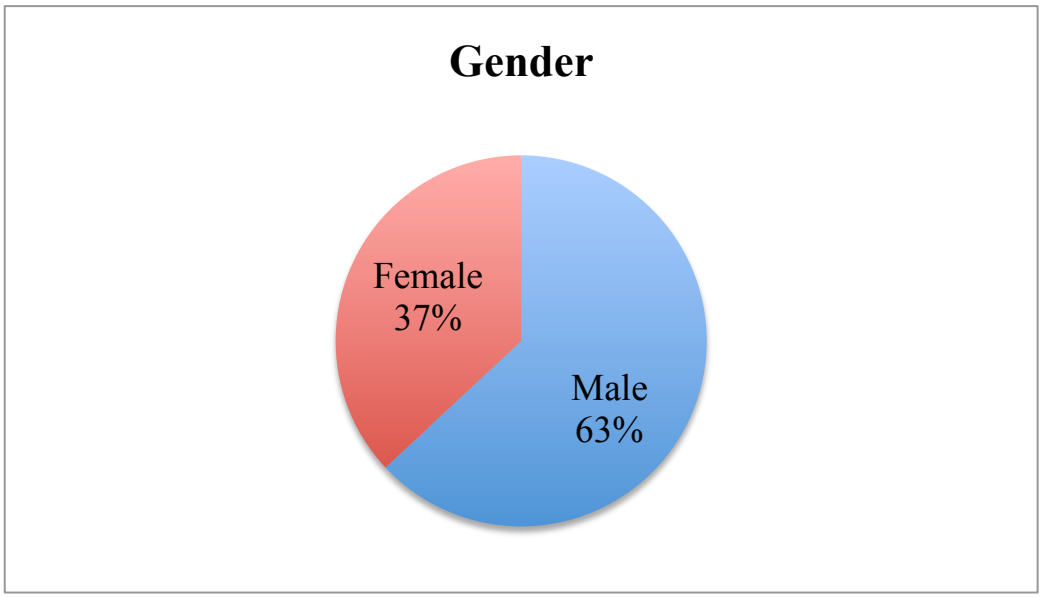
Demographic profile of the patients who underwent optical keratoplasty with the donor corneas through HCRP program from 1.01.2016 – 31.03.2016

Mean age of the patient who underwent optical keratoplasty in the study was 54.50 years. The range varied from 13 - 79 years. Out of the 46 patients 29 were male (63%) and 17 were female (37%).

Table 16: Gender distribution

Gender	n	%
Male	29	63.0
Female	17	37.0
Total	**46**	**100**

Chart 14: Gender distribution



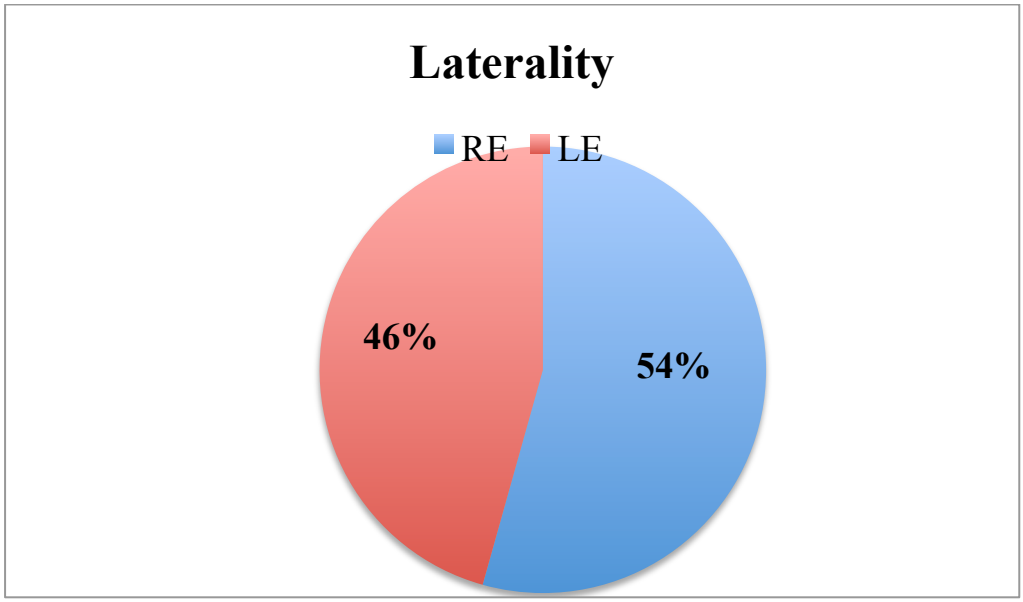
LATERALITY OF EYE:

The optical keratoplasty was done in 25 right eyes and 21 left eyes.

Table 17: Laterality of eyes

Eye	n	%
RE	25	54.4
LE	21	45.6
Total	**46**	**100**

Chart 15: Laterality of eye



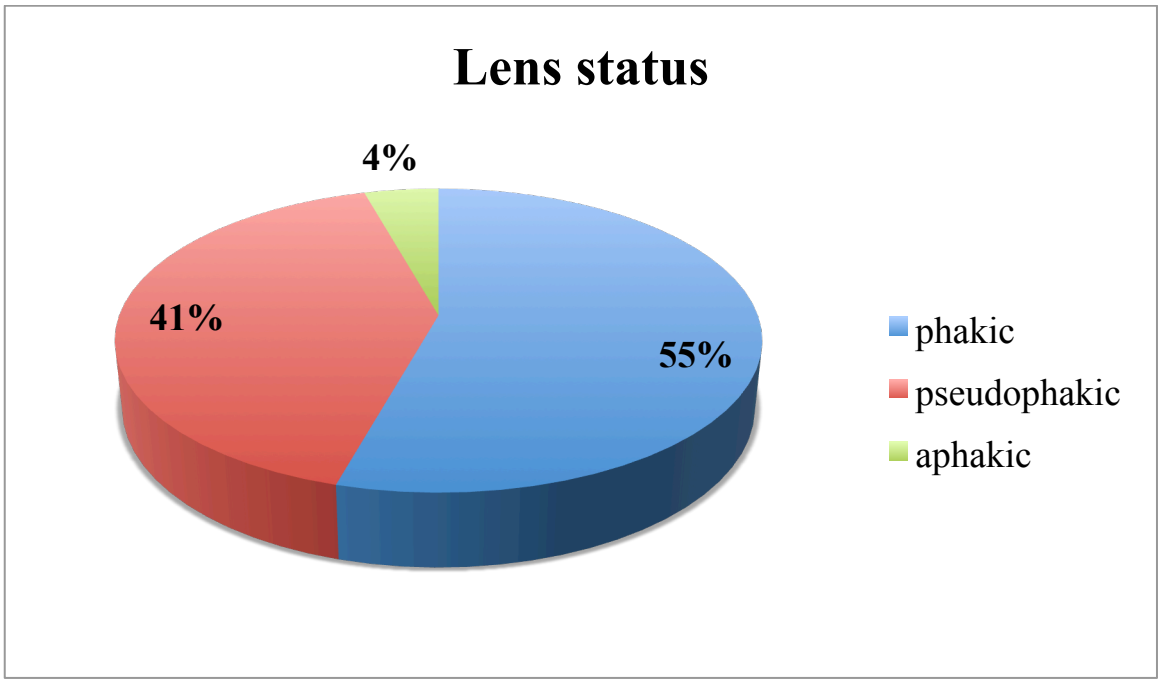
LENS STATUS:

Out of 46 eyes, 25 eyes were phakic, 19 eyes were pseudophakic and 2 eyes were aphakic.

Table 18: Showing Lens status

Lens status	n	%
Phakic	26	54.3
Pseudophakic	19	41.3
Aphakic	2	4.4
Total	**46**	**100**

Chart 16: Lens status



DIAGNOSIS:

PKP and DSAEK were done in patient with various corneal disorders. Pseudophakic bullous keratopathy was the most commonest amongst all accounting for 15 eyes out of 50 eyes (32.6%) followed by Failed graft in 11 eyes (23.9%), corneal scar in 8 eyes (17.4%) and phakic bullous keratopathy in 4 eyes (8.7%).

Chart 17: Pre Op Diagnosis

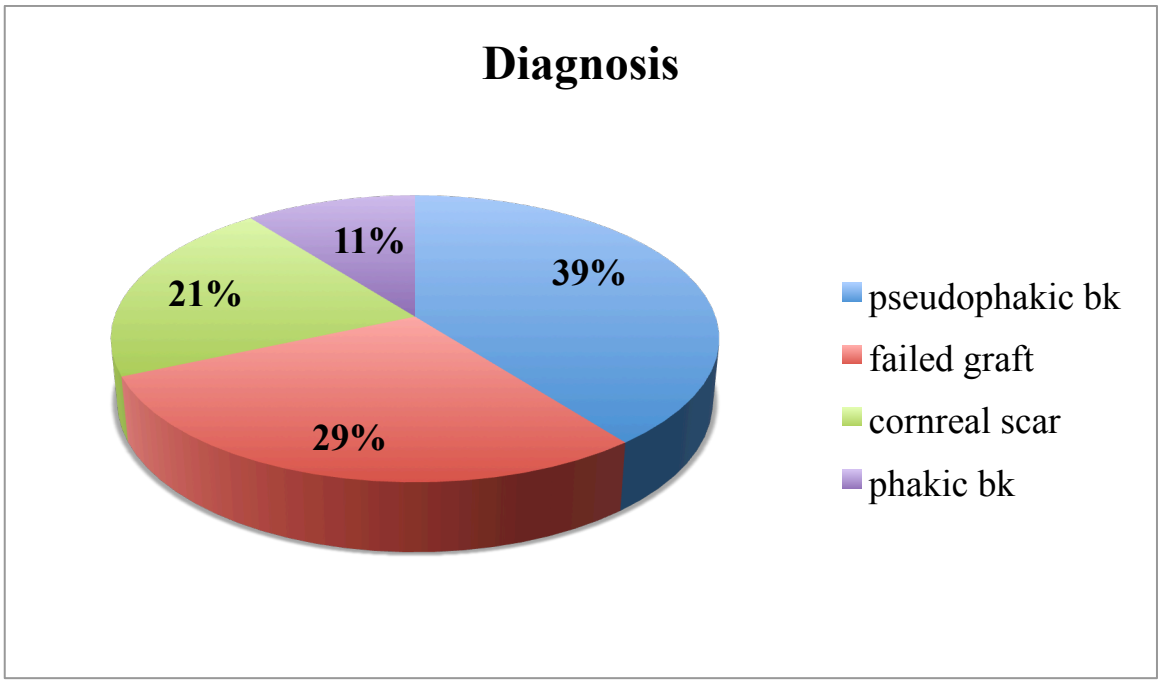


Table 19: Pre op Diagnosis

Diagnosis	n	%
Phakic bullous keratopathy	4	8.7
Pseudophakic bullous keratopathy	15	32.6
Aphakic bullous keratopathy	1	2.2
Fuch's dystrophy	2	4.3
Failed graft	11	23.9
Corneal scar	8	17.4
Keratoconus	2	4.3
Others *Avellino dystrophy* *Macular dystrophy* *Salzmann*	3 *1* *1* *1*	6.5
Total	**46**	**100**

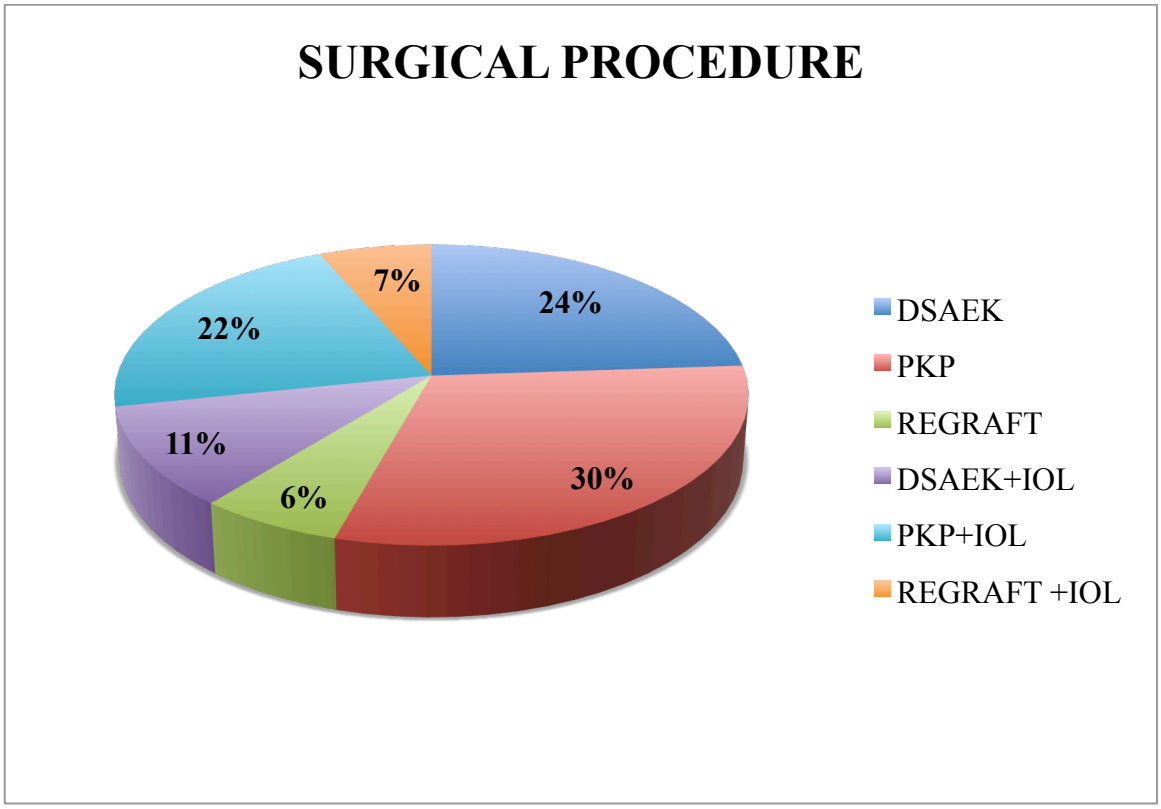
SURGICAL TECHNIQUE:

Out of 46 eyes 14 eyes underwent PKP and 10 eyes underwent PKP with IOL implantation and 11 eyes underwent DSAEK and 4 eyes DSAEK with IOL implantation.

Table 20: Types of keratoplasty underwent by patients

Procedure	n	%
DSAEK	11	23.9
DSAEK with PCIOL	4	8.7
DSAEK with SFIOL	1	2.2
PKP	14	30.4
PKP + IOL	10	21.7
Regraft	3	6.5
Regraft + IOL	3	6.5
Total	**46**	**100**

Chart 18: Type of Optical Keratoplasty



FOLLOW UP:

Out of 46 patients, 40 patients completed the 6 months follow up period. Two patients did not come after their 1st month follow up visit. For another four patients their 3rd month follow up was the last visit.

Table 21: Follow up Period

Follow up time period	Number of patients (n)	Percentage (%)
Completed 6 months follow up	40	87
Lost to follow up after 3 months	4	8.7
Lost to follow up after 1 month	2	4.3
Total	46	100

INTRA OCULAR PRESSURE:

IOP was assessed for all the patients pre operatively and also during the immediate postop, 1 month, 3 month and 6 month follow up. Pre operative intra ocular pressure was normal in all the patients. However 4 patients presented with high IOP secondary to steroid usage and were started on topical anti glaucoma drugs.

Table 22: Intra ocular pressure during follow up

Intra ocular pressure during follow up	Normal	Increased
Pre operative	46	0
Immediate postop	45	1
1 month	45	1
3 month	44	0
6 month	38	2

VISUAL ACUITY:

Visual acuity was recorded by snellen's chart in all the patients on all the visits. Best-corrected visual acuity (BCVA) was analyzed for those who completed 6 month follow up.

Snellen log MAR BCVA at the end of 6 months was 0.84 ± 0.48 (mean± SD) which was significantly better (p value of <0.001 using Wilcoxon- sign rank test) than preoperative Snellen log MAR BCVA 1.89± 0.55.

Table 23: UCVA at different follow up

UCVA	n	Mean (SD)	Min-Max	P-Value
Pre-OP	46	1.89(0.55)	1-2.9	<0.001*
1st month follow-up	46	1.03(0.44)	0.18-2.1	
3rd month follow-up	44	0.98(0.47)	0.18-2.6	
6th month follow-up	40	0.95(0.42)	0.3-2.1	

**Friedman test*

Table 24: BCVA per op and 6th month follow up

BCVA	n	Mean (SD)	Min-Max	P-Value
Pre-OP	46	1.89(0.55)	1.0 – 2.9	<0.001*
6th month follow-up	40	0.84(0.48)	0.18 – 2.1	

**Wilcoxon signed rank test*

Chart 19: UCVA Pre Op and Post Op

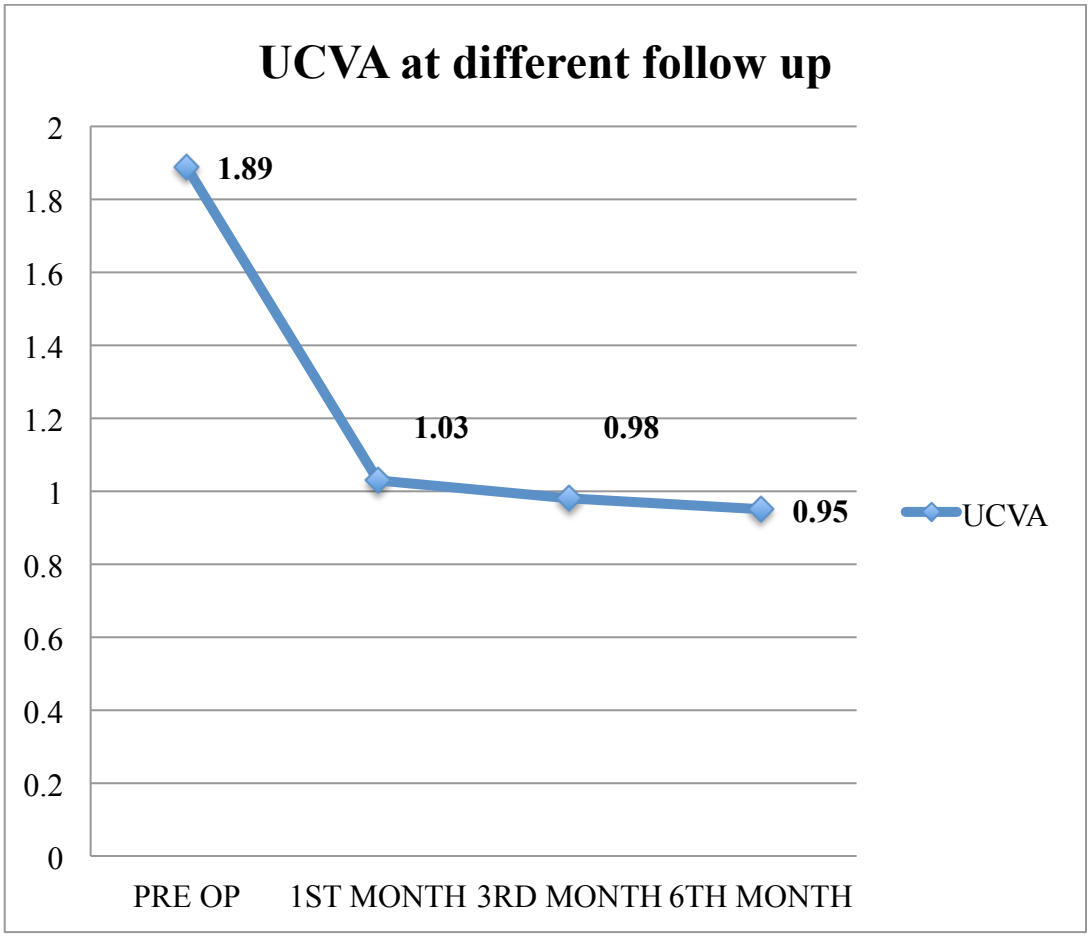
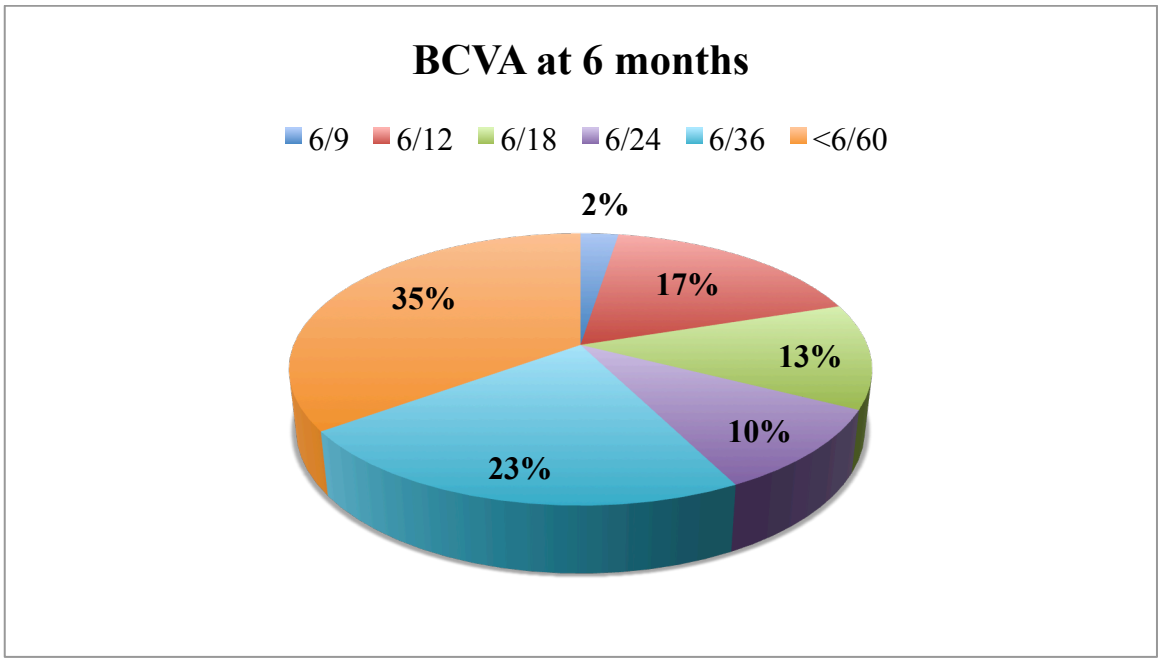


Table 25: BCVA by snellen's chart at preoperative and 6 month follow up

BCVA by snellen's chart at preoperative and 6 month follow up		
	Preoperative (n=46)	**6 month (n=40)**
6\6	0	0
6\9	0	1(2.5%)
6\12	0	7(17.5%)
6\18	0	5(12.5%)
6\24	0	4(10%)
6\36	0	9(22.5%)
6\60 or worse	46 (100%)	14(35%)

Chart 19: BCVA at 6 months



COMPLICATIONS:

Complications occurred in 11 eyes out of 46 eyes. Fortunately there were nil intraoperative complications. Two patients had wound gaping in post op for which resuturing was done.

Two patients developed steroid induced glaucoma for which anti glaucoma medications were started.

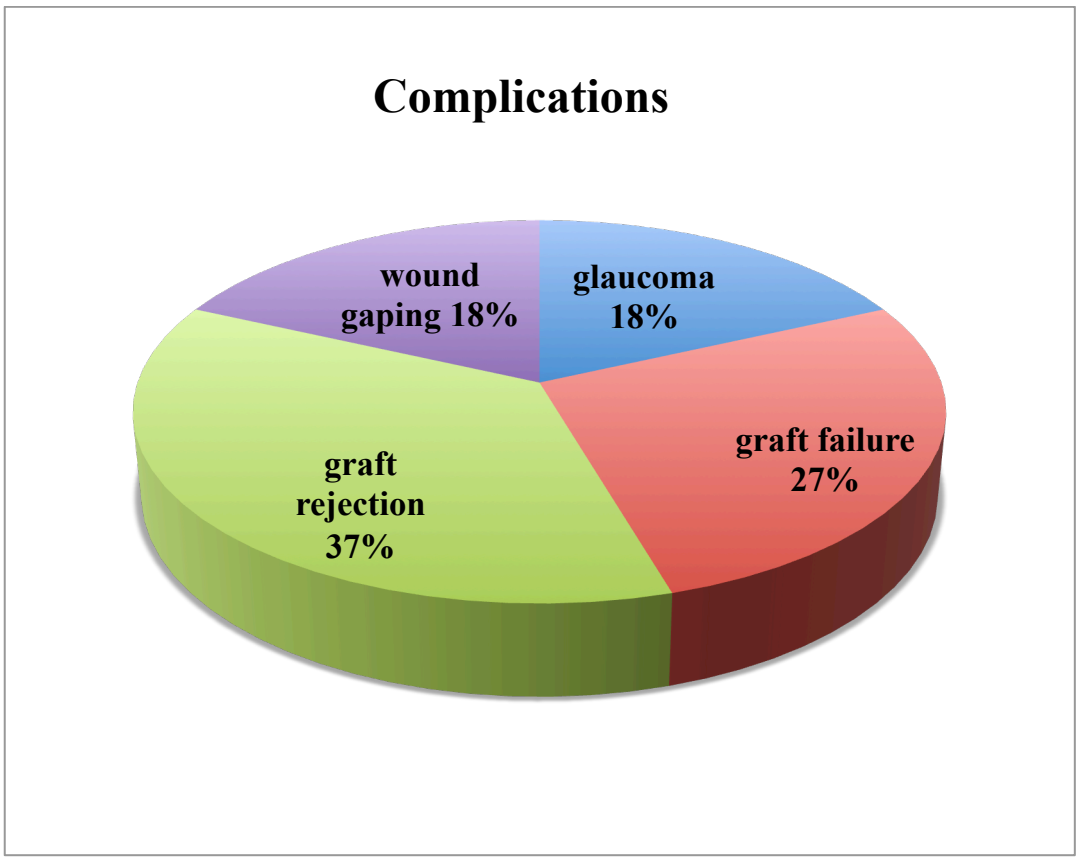
Three patients had graft failure at 6th month follow up and planned for Regraft later.

During the 1month follow up one patient had acute graft rejection because he stopped using steroid eye drops and recovered well with topical steroids and systemic steroids. 3 patients had graft rejection at 6th month follow up which was treated with systemic and topical steroids.

Table 26: Complications

COMPLICATIONS	n (%)
Iatrogenic glaucoma	2 (18.1%)
Wound gaping	2(18.1%)
Graft rejection	4(36.3%)
Graft failure	3(27.2%)

Chart 20: Post Op Complications



2.4 DISCUSSION

The aim of out study is to analyze the efficacy of Hospital Cornea Retrieval Program by comparing the demography, quality of the tissue and utilization of corneal tissues obtained from HCRP and Home Retrieval.

India has one of the largest populations of corneal blindness, which can be treated by corneal transplantation. There should be constant supple of high quality corneal tissue. There is a huge gap in demand and supply of good quality corneal tissues. Development of new strategies to decrease this gap will play a huge role in reducing corneal blindness.

Our study is hospital based Prospective non-randomized observational study conducted at Aravind eye hospitals Madurai. We included 493 donors and analyzed 986 eyes under two groups in a period of one year.

DEMOGRAPHICS:

We found that out of 986 eyes 61.5 % belonged to HCRP and 38.5% to Home Retrieval group. HCRP was introduced in our hospital and there has been a steady rise in number of tissues collected. This was consistent with observations made by Bakshi et al (10).

The mean age group in our study in HCRP is 43.87 years and Home retrieval is 72.81 years. Most of the donors in HCRP group belong to 21-40 years whereas in Home retrieval group it is 61-80 years. This indicates that HCRP can be a very good source of young donors. Whereas in Venugopal et al most of the potential donors belonged to 41-60 years of age. (8).

In HCRP group 77.6% donors were male and 52.1% in Home retrieval group. This male preponderance in HCRP group can be attributed to road traffic accidents related deaths in HCRP group. This is in accordance with the study made by Venugopal et al (8).

Road traffic accident was the cause of death among 132 deaths in HCRP, OPC poisoning contributing to 41 deaths followed by heart disease. Whereas in Home retrieval group heart disease and respiratory disease were the common cause of deaths. In the study conducted by Venugopal et al OPC poisoning was the most common cause of death among potential donors in HCRP. (8). In a study conducted by Kumar et al 72% of trauma related deaths were eligible for corneal donation (1).

Our study analyzed the medico legal status of the deaths among HCRP. 73% of the donors in HCRP group came under medico legal cases. This indicates that medico legal case was not a barrier in HCRP.

EVALUATION OF DONOR TISSUES:

92.6% of eyes in HCRP were phakic whereas only 48.4% of eyes in home retrieval were phakic. This could be due to young donors among HCRP. Since cataract surgery can lead to endothelial loss lens status plays an important role in donor evaluation.

In slit lamp evaluation of donor eyes most of the eyes belonged to "good" and "very good" category in HCRP group. In Home retrieval 36% belonged to "good" category and 27% in "Not Suitable For Surgery" group. This is in consistent with the statistics released by eye banking of India comparing HCRP and home retrieval.

The mean endothelial count in specular microscopy in HCRP group was higher when compared to home retrieval group which suggests that donor corneas from HCRP group is superior in quality when compared to voluntary donation.

UTILIZATION AND DISTRIBUTION OF DONOR TISSUES:

The efficacy of HCRP was analyzed by comparing the utilization rate of donor tissues between two groups. In our study utilization rate of HCRP was 79.4% and in home retrieval was only 52.9 %, which was statistically significant (p value <0.0001). This finding was consistent with statistics released by eye banking of India. In the study conducted by Bakshi et al utilization of HCRP was 54.24% and home retrieval was 42.6%(10).

One of the advantages of HCRP according to studies are reduced death to enucleation time but in our study the mean death to enucleation was more in HCRP group when compared to home retrieval group.

Keratoplasty like DSAEK and PKP demands good quality donor tissue. Out of 363 PKP's 78.5 % were contributed by HCRP and out of 77 DSAEK surgeries 83.1% belonged to HCRP group. This indicates that HCRP tissues were better in quality for optical keratoplasty. *Bakshi Et Al* Stated That Utilization Of Donor Corneas For Optical Keratoplasty In HCRP And Home Retrieval Were 70.90% and 39.93%, which was consistent with our study (10).

To further analyze the long-term benefits of HCRP we studied the postoperative outcomes of patients who underwent optical keratoplasty with donor eyes from HCRP for duration of 3 months. Out of 46 patients 63% were male.

Most common cause of optical keratoplasty was pseudophakic bullous keratopathy and graft failure. 24 patients underwent PKP and 16 patients underwent DSAEK. During follow up assessment of visual acuity, there was significant statistical difference in visual acuity at end of 1month, 3 months and 6 months (P value less than 0.001). BCVA at the end of 6 months was 0.84 ± 0.48(mean± SD) which was

significantly better (p value of <0.001) than preoperative BCVA 1.89 ± 0.55. 11 patients had post op complications like steroid induced glaucoma, graft rejection and wound gaping and graft failure.

In summary HCRP had younger donors with high quality corneas and better endothelial count which lead to more optical keratoplasty when compared to home retrieval group.

2.5 LIMITATION:

1. Could not identify the conversion rate in HCRP
2. Did not compare the optical keratoplasty between HCRP and Home retrieval corneal donation
3. We could not identify the potential donors in HCRP and factors that involved in wastage of tissues

CONCLUSION:

- HCRP can bridge the demand supply gap that currently exits for a good quality corneal tissue which will contribute enormously in eliminating corneal blindness
- It is more effective system of corneal retrieval in terms of both collection and utilization

BIBLIOGRAPHY

1. Kumar A, Kumar A, Bali SJ, Tandon R. Performance analysis of efforts towards promotion of corneal donation at a tertiary care trauma center in India. Cornea. 2012;31(7):828-31.
2. Gupta N, Vashist P, Tandon R, Gupta SK, Dwivedi S, Mani K. Prevalence of corneal diseases in the rural Indian population: the Corneal Opacity Rural Epidemiological (CORE) study. Br J Ophthalmol. 2015;99 (2):147-52.
3. Muraine M, Toubeau D, Menguy E, Brasseur G. Analysing the various obstacles to cornea postmortem procurement. Br J Ophthalmol. 2002;86(8):864-8.
4. Krieglstein TR, Welge-lüssen UC, Priglinger S, Kampik A, Priemer F, Neubauer AS. Consenting to cornea donation: influencing factors. Graefes Arch Clin Exp Ophthalmol. 2002;240(10):816-21.
5. Barboza AP, Pereira RC, Garcia CD, Garcia VD. Project of cornea donation in the hospital complex of Santa Casa de Porto Alegre, Brazil. Transplant Proc. 2007;39(2):341-3.
6. Salim A, Brown C, Inaba K, et al. Improving consent rates for organ donation: the effect of an inhouse coordinator program. J Trauma. 2007;62(6):1411-4.

7. Sangwan VS, Gopinathan U, P Garg, Rao GN. Eye banking in India: A road ahead.JIMSA 2010;23(3).
8. Venugopal KC, Melsakkare SR, Manipur SR, Acharya P, Ramamurthy LB. Potential for Hospital Based Corneal Retreival in Hassan District Hospital. J Clin Diagn Res. 2015;9(8):NC05-7.
9. Oliva MS, Schottman T, Gulati M. Turning the tide of corneal blindness. Indian J Ophthalmol. 2012;60(5):423-7.
10. Sharma N, Agrawal N, Maharana PK, Agarwal T, Vanathi M, Vajpayee RB. Comparison of Hospital Cornea Retrieval and Voluntary Eye Donation Program in Eye Banking. Eye Contact Lens. 2017;
11. Cunningham WJ, Moffatt SL, Brookes NH, et al. The New Zealand National Eye Bank study: trends in the acquisition and storage of corneal tissue over the decade 2000 to 2009. Cornea. 2012;31(5):538-45.
12. Tandon R, Verma K, Vanathi M, Pandey RM, Vajpayee RB. Factors affecting eye donation from postmortem cases in a tertiary care hospital. Cornea. 2004;23(6):597-601.
13. Patel HY, Brookes NH, Moffatt L, et al. The New Zealand National Eye Bank study 1991-2003: Aut review of the source and management of corneal tissue. Cornea. 2005;24(5):576-82.

14. Gillon S, Hurlow A, Rayment C, Zacharias H, Lennard R. Obstacles to corneal donation amongst hospice inpatients: a questionnaire survey of multi-disciplinary team member's attitudes, knowledge, practice and experience. Palliat Med. 2012;26(7):939-46.
15. NPCB Newsletter April – June 2012.
16. Whitcher JP, Srinivasan M, Upadhyay MP. Corneal blindness: A global perspective. Bull World Health Organ. 2001;79:214–21.
17. Patil R. Status of Eye Donation Awareness and Its Associated Factors Among Adults in Rural Pondicherry. Journal Of Clinical And Diagnostic Research. 2015Feb;9(2):LC01–LC04.
18. Priyadarshini B, Srinivasan M, Padmavathi A, Selvam S, Saradha R, Nirmalan PK. Awarness of eye donation in an adult population of southern India. Indian J Ophthalmol. 2003:51(1)101-104.
19. Dandona L, Dandona R, Srinivas M, Mandal P, McCarty CA, Rao GN. Unilateral visual impairment in an urban population in southern India. Indian J Ophthalmol. 2000;48:59–64.
20. Gupta N, Tandon R, Gupta SK, Sreenivas V, Vashist P. Burden of Corneal Blindness in India. Indian Journal of Community Medicine : Official Publication of Indian Association of Preventive & Social Medicine. 2013;38(4):198-206.

21. Lin CC, Prajna L, Srinivasan M, et al. Seasonal trends of microbial keratitis in south India. Cornea. 2012;31(10):1123-1127
22. Singh G, Palanisamy M, Madhavan B, Rajaraman R, Narendran K, Kour A, et al. Multivariate analysis of childhood microbial keratitis in South India. Ann Acad Med Singapore. 2006;35:185–9.
23. Prajna VN, Pillai MR, Manimegalai TK, Srinivasan M. Use of traditional eye medicines by corneal ulcer patients presenting to a hospital in South India. Indian J Ophthalmol.
24. Burton MJ, Mabey DC. The global burden of trachoma: A review. PLoS Negl Trop Dis. 2009;3:e460.
25. Mariotti SP, Pascolini D, Rose-Nussbaumer J. Trachoma: Global magnitude of a preventable cause of blindness. Br J Ophthalmol. 2009;93:563–8.
26. Rahi JS, Sripathi S, Gilbert CE, Foster A. Childhood blindness due to vitamin A deficiency in India: Regional variations. Arch Dis Child. 1995;72:330–3.
27. Pandrowala H, Bansal A, Vemuganti GK, Rao GN. Frequency, distribution, and outcome of keratoplasty for corneal dystrophies at a tertiary eye care center in South India. Cornea. 2004;23:541–6.
28. Basak K. Eye Banking and HCRP: The New Task Ahead. Kerala Journal Of Ophthalmology. 2010:22(2):163-166.

29. Rodríguez-Villar C, Ruiz-Jaramillo M, Paredes D, Ruiz A, Vilardell J, Manyalich M. Telephone Consent in Tissue Donation: Effectiveness and Efficiency in Postmortem Tissue Generation. Transplantation Proceedings. 2007;39(7):2072–5.
30. Geissler A, Gerbeaux P, Maitrejean C, Durand-Gasselin J. Cornea Donation: Evaluation of a Training Session to Obtain Consent by Telephone. Transplantation Proceedings. 2005;37(10):4634–6.
31. Joshi S, More P, Deshpande M, Jagdale S. Outcome of optical penetrating keratoplasties at a tertiary care eye institute in Western India. Indian Journal of Ophthalmology. 2012;60(1):15.
32. Chen Y, Liao C, Gao M, Belin MW, Wang M, Yu H, et al. Efficacy and Safety of Corneal Transplantation Using Corneas from Foreign Donors versus Domestic Donors: A Prospective, Randomized, Controlled Trial. Journal of Ophthalmology. 2015;2015:1–10.
33. Pineda R. Corneal Transplantation in the Developing World. Cornea. 2015;34.
34. Rao GN, Gopinathan U. Eye banking: an introduction. Community Eye Health. 2009;22(71):46-47.
35. Tandon R, Singh A, Gupta N, Vanathi M, Gupta V. Upgradation and modernization of eye banking services: Integrating tradition with innovative policies and current best practices. Indian Journal of Ophthalmology. 2017;65(2):109-115.

36. Van Meter WS, Katz DG, White H, Gayheart R. Effect of Death-To-Preservation Time on Donor Corneal Epithelium. Transactions of the American Ophthalmological Society. 2005;103:209-224.
37. Ronanki VR, Sheeladevi S, Ramachandran BP, Jalbert I. Awareness regarding eye donation among stakeholders in Srikakulam district in South India. BMC Ophthalmology. 2014;14:25.
38. Kumar A, Kumar A, Bali SJ, Tandon R. Performance Analysis of Efforts Towards Promotion of Corneal Donation at a Tertiary Care Trauma Center in India. Cornea. 2012;31(7):828–31.
39. Pels E, Rijneveld W. Organ Culture Preservation for Corneal Tissue. Eye Banking Developments in Ophthalmology. 2009;:31–46.
40. Lawlor M, Dobbins T, Thomas K-A, Billson F. Consent for corneal donation: the effect of age of the deceased, registered intent and which family member is asked about donation. British Journal of Ophthalmology. 2006Jan;90(11):1383–5.
41. Neena J, Rachel J, Praveen V, Murthy GVS. Rapid Assessment of Avoidable Blindness in India. PLoS ONE. 2008Jun;3(8).

42. Frigo A, Fasolo A, Capuzzo C, Fornea M, Bellucci R, Busin M, et al. Corneal Transplantation Activity Over 7 Years: Changing Trends for Indications, Patient Demographics and Surgical Techniques From the Corneal Transplant Epidemiological Study (CORTES). Transplantation Proceedings. 2015;47(2):528–35.
43. Gain P, Jullienne R, He Z, Aldossary M, Acquart S, Cognasse F, Thuret G. Global Survey of Corneal Transplantation and Eye Banking. JAMA Ophthalmol. 2016;134(2):167–173
44. Karthi LP, Agnihotri AK. Corneal Transplants - an overview with an emphasis on legal aspects and current scenario in Mauritius. Internet Journal of Medical Update - EJOURNAL. 2007Jan;2(2).
45. Geissler A, Paoli K, Maitrejean C, Durand-Gasselin J. Rates of potential and actual cornea donation in a general hospital: Impact of exhaustive death screening and surrogate phone consent. Transplantation Proceedings. 2004;36(10):2894–5.
46. Cunningham WJ, Brookes NH, Twohill HC, Moffatt SL, Pendergrast DG, Stewart JM, et al. Trends in the distribution of donor corneal tissue and indications for corneal transplantation: the New Zealand National Eye Bank Study 2000-2009. Clinical & Experimental Ophthalmology. 2011Apr;40(2):141–7.

47. Uhlig CE, Koch R, Promesberger J, Hirschfeld G, Schmidt H, Seitz B, et al. Attitudes toward postmortem cornea donation in Germany: a multicenter survey. Graefes Archive for Clinical and Experimental Ophthalmology. 2014;252(12):1955–62.
48. Kaufman HE. Optisol Corneal Storage Medium. Archives of Ophthalmology. 1991Jan;109(6):864

ABBREVIATIONS

HCRP	Hospital Cornea Retrieval Program
SD	Standard deviation
IOP	Intra ocular pressure
VA	Visual acuity
BCVA	Best corrected visual acuity
UCVA	Uncorrected visual acuity
AC	Anterior chamber
PKP	Penetrating keratoplasty
DSAEK	Descemet's stripping automated endothelial keratoplasty
TPK	Therapeutic Keratoplasty

Informed Consent form to participate in a clinical study

Study Title: Efficacy of Hospital Cornea Retrieval Program In Alleviating Corneal Blindness

Subject's Name: _____ **MR No: _____**

Subject ID No: _____Date of Birth / Age: _____

		Please put initial in the box (Subject)
(i)	I confirm that I have understood the information about the study, procedures and treatments for the above study and have had the opportunity to ask questions and I received satisfactory answers to all of my questions. I have been given a copy of the informed consent form to take home	[ ]
(ii)	I understand that my participation in the study is voluntary and that I am free to withdraw at any time, without giving any reason, without my medical care or legal rights being affected. However, this is may not be possible for certain surgical procedures	[ ]
(iii)	I understand that the Investigator of the study to access my health records for the research purpose. However, I understand that my identity will not be revealed in any information released to third parties or published.	[ ]
(iv)	I agree not to restrict the use of any data or results that arise from this study provided such a use is only for scientific purpose(s)	[ ]
(v)	I agree to take part in the above study.	[ ]

Signature (or Thumb impression) of the Subject: _____

Date: _____/_____/_____

Subject's Name: _____

Signature (or Thumb impression) of Legally Acceptable Representative (LAR):

_____ Date: _____

Signature of the Investigator: _____Date: _____/_____/_____

Investigator's Name: _____

Signature of the Witness _____
Date:_____/_____/_____

Name of the Witness: _____

EYE BANK CONSENT FORM

கண் வங்கி

அரவிந்த் கண் மருத்துவமனை

அண்ணாநகர், மதுரை – 20

தொலைபேசி எண் – (0452) 4356100

கண் தான ஒப்புதல் படிவம்

பார்வையிழந்தவர்களுக்கு உதவும் விதமாக, நான்.....
(கண்தானம் ஒப்புதல் அளிப்பவரின் பெயரும், முகவரியும்)

.....

.....

இன்று ..... மணியளவில் இறந்த திரு/திருமதி .....
(இறந்த தேதி, நேரம்) (இறந்தவரின் பெயர்)

அவர்களின் ஈமச்சடங்குகளை நடத்தும் பொறுப்புடைய நான் எனது .....
(உறவுமுறை)

கண்களை அரவிந்த் கண் வங்கிக்கு தானமாக அளிக்க முழு மனதுடன் சம்மதிக்கிறேன். அன்னாரது கண்களை கருவிழி மாற்று அறுவை சிகிச்சை, கண்ணியல் சிகிச்சை மற்றும் மருத்துவ பயிற்சி ஆராய்ச்சிக்கு பயன்படுத்திக் கொள்ளலாம்.

மேலும் அன்னாரது கண்கள் மேலே குறிப்பிட்டவற்றிக்கு பயன்படுத்துவதற்கும் பரிசோதனை செய்வதற்கும் உதவும் விதமாக இறந்தவரின் உடலிலிருந்து சிறிதளவு இரத்தம் மற்றும் அவரது மருத்துவ குறிப்புகள் ஆகியவற்றை பெற்றுக்கொள்ளலாம் என்றும் முழு மனதுடன் சம்மதிக்கிறேன்.

1. _____ _____ _____
கண் தானம் ஒப்புதல் அளிப்பவரின் பெயர் உறவு முறை கையொப்பம்

முகவரி _____

_____

2. _____ _____ _____
சாட்சிதாரரின் பெயர் உறவுமுறை கையொப்பம்

முகவரி _____

_____

3. _____ _____ _____
சாட்சிதாரரின் பெயர் உறவுமுறை கையொப்பம்

முகவரி _____

_____

Sky

AEH/RAIEB/FOR/01A

EYE BANK FORMS

Rotary-Aravind International Eye Bank
MEMBER INTERNATIONAL FEDERATION OF EYE BANKS
1, Anna Nagar, Madurai - 625 020, Tamil Nadu, India
Phone : 91-452-4356100; Fax : 91-452-2530984; Email : eyebank@aravind.org

Form C

Donor Name :

Donor Medical Information

Death Verified By : Death Certificate/Onsite Verification

Cooling Method : Not cooled/Refrigeration/Ice/Wet Gauze

Date-Time Body Subjected to Refrigeration : _____

Date-Time Body Removed from Refrigeration : _____

Physical Assessment

Is body identified using ID tag? **Yes/No**

If Yes, Technician Identifying Body: _____

If No, who identified body to the technician? _____

Technician performing physical assessment: _____

Gross Physical examination findings: _____

_____

Does physical examination reveal other evidence of HIV infection or high-risk behaviour, such as:

Jaundice / Icterus? **Yes/ No**

Evidence of Sexually Transmitted Disease (e.g. Genital Lesions, Perianal Warts) **Yes / No**

Lymphadenopathy (i.e. Enlarged Lymph Nodes) **Yes / No**

White spots in mouth **Yes/ No/ Unable to Visualize (Explain _____)**

Needle Tracks or Other Signs of IV Drug Use: **Yes / No**

Blue/purple or gray/black spots/lesions: **Yes / No**

Evidence of blood loss? **Yes / No**

Red /Skin lesions (non-genital)?Yes / No

Evidence of smallpox vaccination or scab?Yes / No

Mucous Membrane Hemorrhages?Yes / No

Explain if any answers are "Yes": _____

Donor Name :

Eye Assessment/Penlight Exam

	OD	OS
Condition of Superior Lid: Comments:	Unremarkable / inflammation / Laceration / Edematous / Contusion / Abrasion	Unremarkable / inflammation / Laceration / Edematous / Contusion / Abrasion
Condition of Inferior Lid: Comments:	Unremarkable / inflammation / Laceration / Edematous / Contusion / Abrasion	Unremarkable / inflammation / Laceration / Edematous / Contusion / Abrasion
Condition of Conjunctiva: Comments:	Unremarkable / Discharge / Petechia/ Inflammation / Icteric / Pterygium / Blood shot / Edematous	Unremarkable / Discharge / Petechia / Inflammation / Icteric / Pterygium / Blood shot / Edematous
Condition of Epithelium: Comments:	Unremarkable / Exposure / Sloughing/ Cloudiness / Contact lens / Glass / Debris	Unremarkable / Exposure / Sloughing / Cloudiness / Contact lens / Glass / Debris
Condition of Corneal Stroma: Comments:	Unremarkable / Arcus / Infiltrate / Scar/ Opacity/ Surgical Scar	Unremarkable / Arcus / Infiltrate / Scar/ Opacity/ Surgical Scar
Condition of Intraocular	Phakic / Aphakic / Pseudophakic	Phakic / Aphakic / Pseudophakic
Iris Color:	Black/Brown/Blue/Grey/Hazel	Black / Brown / Blue / Grey/Hazel
Pupil Diameter (mm)		
Abnormalities		
Evidence of Surgery	Yes / No	Yes / No
If, Yes Specify		
Performed by:		

Eye Recovery Information

Recovery Method: **Enucleation / In-Situ** Recovery Date – Time: _____

Recovery done by: _____ Assisted by: _____

Comments: _____

Recovery intent: **Transplant / Research / Training**

Storage Medium:_____ Lot No. _____ Exp. Date: _____

Sclera Recovered? **Yes/ No**

Laboratory Information

WBC

WBCs Performed: **Yes / No** If, Yes

Date – Time _____ Count _____

Date – Time _____ Count _____

Date – Time _____ Count _____

Temperature

Temperature Recorded: **Yes / No** If, No Reason _____

If Yes,

Date – Time _____ Result _____ Units _____

Date – Time _____ Result _____ Units _____

Date – Time _____ Result _____ Units _____

Cultures

Cultures Done: **Yes / No**

Culture Source _____ Date – Time _____ Result_____

Culture Source _____ Date – Time _____ Result _____

Culture Source _____ Date – Time _____ Result _____

[redacted]

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Phone : 91-452-2532653, 4356100; Fax : 91-452-2530984; Email : eyebank@aravind.org

Slit Lamp Evaluation of Whole Globe

Tissue ID # _____

Cornea Size _____ mm OD	Cornea Size _____ mm OS
EPITHELIUM 1. Intact surface? Yes / No 2. Haze? Degree: light / moderate / heavy 3. Exposure Keratitis? Yes / No Amount: _____% (of surface) Degree: light / moderate / heavy Location: Central / periphery / mid-periphery Type: diffused/band 4. Sloughing? Yes / No Amount: _____% (of surface) Degree: light / moderate / heavy Location: Central / periphery / mid-periphery 5. Other defects? Yes/No Location: Central / periphery / mid-periphery Dimension: _____ mm	EPITHELIUM 1. Intact surface? Yes / No 2. Haze? Degree: light / moderate / heavy 3. Exposure Keratitis? Yes / No Amount: _____% (of surface) Degree: light / moderate / heavy Location: Central / periphery / mid-periphery Type: diffused/band 4. Sloughing? Yes / No Amount: _____% (of surface) Degree: light / moderate / heavy Location: Central / periphery / mid-periphery 5. Other defects? Yes/No Location: Central / periphery / mid-periphery Dimension: _____ mm
STROMA 1. Clear? Yes / No 2. Cloudiness? Yes / No Degree: light / moderate / heavy 3. ArcusSenilis ? Yes / No Amount: _____ mm (from limbus) Degree: light / moderate / heavy 4. Opacities? Yes / No Lens Status: _____	STROMA 1. Clear? Yes / No 2. Cloudiness? Yes / No Degree: light / moderate / heavy 3. ArcusSenilis ? Yes / No Amount: _____ mm (from limbus) Degree: light / moderate / heavy 4. Opacities? Yes / No Lens Status: _____
DESCEMETS MEMBRANE 1. Folds Amount: None / few /several / numerous Degree: light / moderate / heavy Location: central / periphery / mid-periphery / diffused (total surface)	DESCEMETS MEMBRANE 1. Folds Amount: None / few /several / numerous Degree: light / moderate / heavy Location: central / periphery / mid-periphery / diffused (total surface)
ENDOTHELIUM 1. Scar 2. Guttata 3. KPS 4 . Others	ENDOTHELIUM 1. Scar 2. Guttata 3. KPS 4 . Others
OVER ALL RATING Excellent / Very Good / Good / Fair / NSFS Rating changed ? _____	OVER ALL RATING Excellent / Very Good / Good / Fair / NSFS Rating changed ? _____

[redacted]

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Tissue ID # _____ (OD / OS)
From Penlight Exam : Phakic / Pseudophakic / Aphakic
From Specular Evaluation : Cell Count (per mm2) : _____

SLIT LAMP CORNEA EVALUATION

EPITHELIUM

Clear and Intact		:	Yes / No (if Yes, then Haze, Exposure, and Sloughing fields must remain blank)
Haze		:	None / Mild
Exposure		:	None / Mild / Mild-Moderate / Moderate / Moderate-Severe / Severe
	Location	:	Central / Para central / Peripheral / Mid-peripheral / Diffuse / Band
Sloughing	Location	:	None / Central / Para central / Peripheral / Mid-peripheral / Diffuse
	Area	:	% of total cornea: _____
Debris		:	Yes / No If yes, describe: _____
Comments		:	_____

STROMA

Clear and Compact		:	Clear only / Compact only / Clear and Compact / Neither
Edema		:	None / Mild / Mild-Moderate / Moderate / Moderate-Severe / Severe
	Location	:	Central / Para central / Peripheral / Mid-peripheral / Diffuse
Arcus		:	None / Mild / Mild-Moderate / Moderate / Moderate-Severe / Severe
	clear zone	:	_____ mm in diameter
Opacities 1		:	Surgical (IOL) / Lasik / Other / None
Length / Diameter		:	_____ mm Location, at: _____ mm on button / from limbus Depth: _____ %
Opacities 2		:	Surgical (IOL) / Lasik / Other / None
Length / Diameter		:	_____ mm Location, at: _____ mm on button / from limbus Depth: _____ %
Infiltrate		:	Yes / No
Striae		:	Yes / No
	Location	:	Central / Para central / Peripheral / Mid-peripheral / Diffuse
	Relative # of Striae	:	Few / Few-Several / Several / Several-Numerous / Numerous
Comments		:	_____

DESCEMET'S

Folds		:	None / Mild / Mild-Moderate / Moderate / Moderate-Severe / Severe
	Relative # of folds	:	Few / Few-Several / Several / Several-Numerous / Numerous
Defects		:	None / Descemet's Tears / Defect at IOL scar If yes, describe _____
Comments		:	_____

ENDOTHELIUM

Stress Lines		:	Yes / No
	Location	:	Central / Para central / Peripheral / Mid-peripheral / Diffuse
	Relative # of stress lines	:	Few / Few-Several / Several / Several-Numerous / Numerous
Defects		:	Yes / No If yes, describe _____
Cell Dropout		:	None / Mild / Mild-Moderate / Moderate / Moderate-Severe / Severe
	Location	:	Central / Para central / Peripheral / Mid-peripheral / Diffuse
Polymegathism		:	None / Mild / Mild-Moderate / Moderate / Moderate-Severe / Severe
Pleomorphism		:	None / Mild / Mild-Moderate / Moderate / Moderate-Severe / Severe
Comments		:	_____

ADDITIONAL INFORMATION

Jaundice	:	None / Mild / Mild-Moderate / Moderate / Moderate-Severe / Severe
Lens	:	Phakic / Pseudophakic / Aphakic (refer to Penlight Exam at top of this page)
Scleral rim evaluation	:	Regular / Irregular

Scleral rim 2mm or greater circumferentially? Yes / No If no, describe _____

APPROVAL

IS THIS CORNEA SUITABLE FOR TRANSPLANT?

Suitable for only those checked :

- ☐ PK
- ☐ EK
- ☐ ALK
- ☐ KLA

NOT Suitable for any type of transplant, due to:

- ☐ Epithelium
- ☐ Stroma : Prior refractive surgery / Scar / Infiltrate / Foreign Body / other _____

Data collection pro forma

Title: Efficacy of hospital cornea retrieval program

Serial no. ☐☐☐ Tissue id no. ☐☐☐☐☐☐☐☐☐☐

Group ☐ 1.HCRP 2.Home Retrieval

Name :

Age : ☐☐

Sex: ☐ 1. Male 2.female

Religion : ☐ 1.Hindu 2. Muslim 3. Christians 4.others _____

Primary cause of death: ☐

1) Caner 2) Heart diseases 3) CVA 4) Respiratory diseases 5) Trauma

6) others _____

Circumstances leading to death: ☐

1) cardiac arrest 2)respiratory arrest 3)shock 4) others

Unit : ☐

1)ICU 2) casualty 3)emergency 4) trauma center 5) mortuary 6) ward

Date of death: ☐☐☐☐☐☐

Time of death: ☐☐ ☐☐ hrs

Referral method: ☐ 1) voluntary- family initiated 2) HCRP- motivated

MLC CASE: ☐ 1.yes 2. No

if yes ☐ a) RTA b) homicide c) suicide d) others _____

Penlight examination of the eye:

Evidence of previous surgery: RE ☐ LE ☐ 1.yes 2. No

Lens status: RE ☐ LE ☐ 1.phakic 2. Pseudophakic 3. Aphakia

Eye recovery information:

Date of enucleation: ☐☐☐☐☐☐

Time: ☐☐ ☐☐ hrs

Death to enucleation time: ☐☐ hrs

Slit lamp examination of globe:

Right eye: ☐	Left eye: ☐
1) Excellent 2) Very good 3) Good 4) Fair 5) Not suitable for surgery	1) Excellent 2) Very good 3) Good 4) Fair 5) Not suitable for surgery

Specular microscope: RE: LE:

Suitability of the Cornea: RE: ☐ LE: ☐

1.Suitable for surgery

a. Penetrating keratoplasty
b. Endothelial keratoplasty
c. Therapeutic keratoplasty
d. Others _____

2.Not suitable for surgery

a. Epithelium cause
b. Stroma
c. Descemet's membrane
d. Endothelium

Data Collection Proforma- Optical Keratoplasty

- *Patients details*
- Name
- Age
- Gender: ☐ 1.male 2.female
- Address
- Contact number
- MR number
- Study sample number
- Date

Presenting complaints 1. Yes 2.no

- H/o previous ocular surgery ☐
- H/o of ocular trauma ☐
- H/o pre existing posterior segment disorder ☐
- H/o diabetes/hypertension ☐

Ocular examination:

Visual acuity	RE	LE
UCVA		
BCVA		

Refraction:

	Spherical	Cylindrical	axis	Visual acuity
RE				
LE				

Slit lamp examination: 1. Yes 2. No

	RE	LE
Lids	a) Normal ☐ b) Blepharitis ☐ c) others ☐	a) Normal ☐ b) Blepharitis ☐ c) others ☐
Conjunctiva	a) Bulbar congestion ☐ b) Circumciliary congestion ☐ c) pterygium ☐ d) others ☐	a) Bulbar congestion ☐ b)Circumciliary congestion ☐ c) pterygium ☐ d) others ☐
Corneal epithelium	a) Intact ☐ b) Defect ☐ c) Erosion ☐ d) Others ☐	a) Intact ☐ b) Defect ☐ c) Erosion ☐ d) Others ☐
Stroma	a) Scar ☐ b) Infiltrate ☐ c) Opacity ☐ d) Vascularization ☐	a) scar ☐ b) infiltrate ☐ c) opacity ☐ d) vascularization ☐

	e) others ☐	e) others ☐
Descemet's membrane	a) Dm folds ☐ b) Defects ☐ c) others ☐	a) dm folds ☐ b) defects ☐ c) others ☐
Endothelium	a) Defects ☐ b) Pigments ☐ c) Others ☐	a) Defects ☐ b) Pigments ☐ c) Others ☐
Anterior chamber	a) Quiet ☐ b) Cells 1+/2+/3+ ☐ c) others ☐	a) Quiet ☐ b) Cells 1+/2+/3+ ☐ c) others ☐
Iris	a) Normal ☐ b) Iridectomy ☐ c) Others ☐	a) Normal ☐ b) Iridectomy ☐ c) Others ☐
Pupil (mm)		
lens	a) Clear b) Immature cataract c) Pseudophakia d) others	a) clear b) immature cataract c) pseudophakia d) others
Fundus		
IOP		
Schimmers		

- Diagnosis – RE

  LE

- Treatment advised: RE/LE PKP

- ***Surgical details :***

➢ Date of surgery

➢ Eye

➢ number of sutures

- Intraoperative complications: ☐

1. Improper trephination
2. Damaged donor button
3. Excessive bleeding
4. Injury to iris-lens diaphragm
5. Expulsion of lens
6. Improper apposition

Post operative complications: 1.yes 2.no

	Immediate	Early	Late
Shallow AC			
Wound leak			
Suture-loose/tight			

Cheese wiring of sutures			
Hyphaema			
Epithelial defect			
Glaucoma			
Graft infection			
Primary graft failure			

	Immediate	1 month	3 month	6 month
Date				
Ucva				
Bcva				
Refraction	Sph cyl axis	Sph cyl axis	Sph cyl axis	Sph cyl axis
iop				

Slit lamp examination:

	Immediate	1month	3 month	6 month
Conjuctiva	1)Normal 2)Ccc congestion	1)Normal 2)Ccc 3)congestion	1)Normal 2)Ccc 3)congestion	1)Normal 2)Ccc congestion
Epithelial	1)Defect 2)Erosions 3)Others	1)Defect 2)Erosions 3)Others	1)Defect 2)Erosions 3)Others	1)Defect 2)Erosions 3)Others
Dm folds	1)Yes 2) No	1)Yes 2) No	1)Yes 2) No	1)Yes 2) No
Graft clarity	1)Clear 2)hazy	1)Clear 2)hazy	1)Clear 2)hazy	1)Clear 2)hazy

ARAVIND MEDICAL RESEARCH FOUNDATION
Institutional Ethics Committee
(REGISTRATION NO. ECR/182/INST/TN/2013 DATED 20.04.2013)

12th December 2015

To
Dr Vinitha L Rashme
MS Resident
Aravind Eye Hospital
Madurai

Dear Dr.Vinitha L Rashme,

Thesis Title: Efficacy of Hospital Cornea Retrieval Program in alleviating corneal blindness

IRB Code: IRB201500217

Thank you for submitting your thesis and seeking the approval from the ethics committee. The documents provided by you for consideration which include the thesis protocol and informed consent forms were reviewed for the research methodology and scientific content. The Ethical committee did not find any correction and has recommended the thesis to go ahead in the present form.

Thanking you

Yours Sincerely,

Dr.Lalitha Prajna
Member Secretary
Institutional Ethics Committee

MEMBER SECRETARY
INSTITUTIONAL ETHICS COMMITTEE
ARAVIND MEDICAL RESEARCH FOUNDATION
No.1, Anna Nagar, Madurai-625 020

1, Anna Nagar, Madurai 625 020, Tamil Nadu, India; Phone: 0452-435 6550; Fax: 91-452-253 0984
E-mail: amrf@aravind.org; www.aravind.org

S.No	Tissue Id No	Group	Name	Age	Sex	Religion	Cause of death	Unit	MLC	MLC cause	lens status RE	Lens status LE	Death to enucleation time	Slit lamp RE	Slit lamp LE	specular mic RE	Specular mic LE	utilisation RE	Utilisation LE
1	2016/01/93	1	chokkam	50	1	1	5	5	1	c	1	1	255	5	5				
2	2016/01/92	1	perumal	90	1	1	5	2	1	a	1	1	120	3	3			3	
3	2016/01/87	2	nirmala	62	2	1	2		2		2	2	240	5	5				
4	2016/01/80	1	babu	45	1	1	5	5	1	a	1	1	180	2	2			2	3
5	2016/01/79	1	rajendran	45	1	1	5	5	1	a	1	1	240	3	3	2754	2754	1	4
6	2016/01/003	2	narayana swamy	80	1	1	3		2		1	1	210	3	3	2725	2512	1	3
7	2016/01/106	1	amutha	36	2	1	6 hanging	5	1	c	1	1	40	3	3	2949	2985	1	2
8	2016/01/38	1	saroja	63	2	1	2	6	2		1	1	180	3	3			3	
9	2016/01/37	1	jagadesh	25	1	1	5	2	1	c	1	1	270	3	3	3759	3375	1	1
10	2016/01/32	1	nagaram	30	2	1	6 opc	1	1	c	1	1	240	3	3	2857	2857	1	1
11	2016/01/110	2	srinivasan	56	1	1	2		2		1	1	120	2	3	2958	2732	6	1
12	2016/01/111	1	palanisamy	80	1	1	5	5	1	a	1	1	120	4	3			5	
13	2016/01/112	1	sannasi	55	1	1	6 opc	3	1	c	1	1	210	5	5				
14	2016/01/113	2	kalyana sundaram	78	1	1	3		2		2	2	300	3	3	2976	2325	1	
15	2016/02/116	2	thangamani	81	2	1	4		2		2	2	210	5	4				
16	2016/02/117	1	rajendran	56	1	1	2	6	2		1	1	240	3	3	2314	3086	4	1
17	2016/02	1	dhanabakiam	75	1	1	6 ckd	6	2		2	2	180	4	4				
18	2016/02/128	1	kannan	73	1	1	3	6	2		1	1	300	4	3				
19	2016/02/124	2	yasodhai	90	2	1	2		2		1	1	270	1	5				
20	2016/02/125	1	gurusamy	67	1	1	5	5	1	c	2	1	120	4	1	1636	2857		2
21	2016/02/126	1	kaveri	40	2	1	5	6	1	a	1	1	240	5	5				
22	2016/02/127	2	gomathi ammal	91	2	1	3		2		2	2	150	4	4				
23	2016/02/129	2	mekala	60	2	1	1		2		1	1	330	2	2	3115	2617	1	
24	2016/02/140	1	mari samy	28	1	1	5	5	1	a	1	1	330	3	3	3389	3164	1	1
25	2016/02/139	2	mahalakshmi	80	2	1	3		2		2	2	240	5	5				
26	2016/02/141	2	anumandhan	82	1	1	2		2		2	2	150	5	5				
27	2016/02/145	1	pandy	45	1	1	5	5	1	a	1	1	210	2	2			1	1
28	2016/03/225	1	suresh	25	1	1	5	5	1	a	1	1	180	1	1	3649	3472	1	1
29	2016/02/218	1	kalidass	37	1	1	5	5	1	a	1	1	210	4	4		2932	5	2
30	2016/02/217	1	chornamal	60	2	1	5	5	1	a	1	1	330	3	3			3	3
31	2016/003/230	1	jacob	65	1	3	2	6	2		1	1	180	5	4		2624		1
32	2016/03/231	2	balasubramaniam	84	1	1	4		2		1	1	90	5	4				
33	2016/03/232	1	subramaniam	76	1	1	5	5	1	a	1	1	120	4	4				
34	2016/03/239	2	namradha	72	2	1	2		2		2	2	240	4	5			3	3
35	2016/03/237	1	sivamani	38	1	1	5	5	1	a	1	1	90	3	3	2624	2564	1	1
36	2016/03/240	1	iswarya	14	2	1	6	5	1	c	1	1	240	2	2	2849	3105	1	1
37	2016/03/243	2	murugaya pandian	83	1	1	2		2		2	2	120	3	3			4	3

38	2016/03/247	2	ganesan	80	1	1	6 ckd		2		2	2	60	3	3				
39	2016/03/250	2	saraswathy	65	2	1	2		2		1	2	120	5	5				
40	2016/03/252	2	rajeshwari	67	2	1	4		2		1	1	290	5	5				
41	2016/03/253	2	dinamani	81	2	1	2		2		2	2	60	5	5				
42	2016/03/257	2	sangunthala	81	2	1	3		2		2	2	130	5	5				3
43	2016/03/263	1	ramar	61	1	1	3	6	2		1	1	90	3	3	2747	2808	1	1
44	2016/03/266	2	kesavan	81	1	1	4		2		2	2	180	3	3	2739		1	5
45	2016/03/267	2	sathyamoorthy	80	1	1	4		2		1	1	120	3	3	3030		2	3
46	2016/03/269	2	chandramohan	63	1	1	2		2		1	1	240	3	3	2057	2127	3	1
47	2016/03/270	2	muthulakshiammal	101	2	1	2		2		1	1	210	5	5				
48	2016/03/274	1	krishnan	54	1	1	3	6	2		2	2	240	4	4			3	3
49	2016/03/275	2	annathai	80	2	1	2		2		2	2	300	3	3			4	5
50	2016/03/270	1	lathalakshmi	40	2	1	5	2	1	a	1	1	240	1	1	3134	2941	2	1
51	2016/03/287	1	gopala krishnan	92	1	1	3	6	2		1	1	60	5	5				
52	2016/02/213	1	thansika	2	2	1	5	6	1	a	1	1	120	3	3	5208	5102		
53	2016/02/212	1	manimegalai	22	2	1	6	1	1	c	1	1	180	2	2	2832	2840	1	1
54	2016/02/208	1	mariyammal33	33	2	1	5	2	1	a	1	1	300	3	3	3472	3322	2	1
55	2016/02/207	1	ramachandran	33	1	1	6	6	1	c	1	1	300	5	3				
56	2016/02/206	1	rajasekaran	32	1	1	5	5	1	a	1	1	180	3	3	3257	3861	1	1
57	2016/02/199	1	janagaraj	55	1	1	2	2	2		1	1	120	3	5	3284		1	
58	2016/02/195	1	velu	85	1	1	5	5	1	a	1	1	360	4	4			3	3
59	2016/02/191	1	arumugam	72	2	1	3	1	2		2	2	50	4	4			3	5
60	2016/02/188	2	subulakshmi	85	2	1	6 ckd		2		2	2	120	3	3				
61	2016/02/184	2	sarojini devi	88	2	1	6 ckd		2		2	2	120	5	5				
62	2016/01/004	1	rajeshwari	57	2	1	5	5	1	a	1	1	300	3	5			3	
63	2016/01/005	1	danaba	89	1	1	3	6	2		1	1	120	4	4				
64	2016/01/007	1	veeramal	65	2	1	5	5	1	a	1	1	300	5	5				
65	2016/01/016	2	srinivasan	80	1	1	3		2		2	2	245	5	5				
66	2016/01/017	1	raja guru	24	1	1	5	5	1	a	1	1	300	2	2	3448	3278	2	2
67	2016/01/021	1	muthaiya	62	1	1	5	5	1	a	1	1	210	3	3	2487	2564	2	1
68	2016/01/022	2	sathya moorthy	74	1	1	2		2		2	2	150	4	4				
69	2016/01/027	1	muthayah	75	1	1	6 opc	5	1	c	1	1	120	3	4	2421	2227	3	3
70	2015/12/1199	1	pandiyarajan	45	1	1	5	5	1	a	1	1	210	4	4	2881	2590	1	1
71	2015/12/1200	2	saroja	78	2	1	4		2		1	1	60	1	1	2849	2409	1	3
72	2015/12/1186	1	sivaraman	23	1	1	6 electric	5	1	d	1	1	240	2	2	3058	3558	3	1
73	2015/12/1193	1	marimuthu	49	1	1	6 ckd	5	2		1	1	360	3	3	2949	2577	2	2
74	2015/12/1195	1	kakku veeran	56	1	1	3	5	2		2	1	240	3	3	2421	2958	2	2
75	2015/12/1151	1	nagendran	19	1	1	5	5	1	a	1	1	180	3	3	3484	3521	4	1
76	2015/12/1152	2	lakshmi	55	2	1	2		2		1	1	240	3	4	2754	2617	2	1
77	2016/03/229	1	suresh	21	1	1	5	5	1	a	1	1	180	3	3	2801		1	3

78	2016/02/176	1	muthukumar	23	1	1	6 hanging	2	1	c	1	1	90	2	2	3448		1	5
79	2016/02/182	1	lalith sundari	70	2	1	2	6	2		1	1	150	3	3			3	3
80	2016/02/170	2	rajendran	78	1	1	2		2		2	2	90	3	4			5	
81	2016/02/172	2	sathiam	54	1	1	3		2		1	2	240	3	3			1	
82	2016/02/171	2	radbanaban	84	1	1	2		2		1	1	120	5	4				
83	2016/02/174	2	swarna ardhanari	70	2	1	2		2		1	1	90	3	3	2617	2347	1	1
84	2016/02/175	2	logambal83	83	2	1	2		2		1	1	270	2	2		1524	5	4
85	2016/03/233	1	siva	27	1	1	5	5	1	a	1	1	90	3	3	3086	2967	1	1
86	2016/01/031	1	muniyammal	50	2	1	2	6	2		1	1	90	3	3	1912		3	3
87	2016/03/295a	2	andhal	86	2	1	2		2		2	2	90	5	5				
88	2016/03/229	1	suresh	21	1	1	5	5	1	a	1	1	180	3	4	2801		1	3
89	2016/03/249	1	saravana kuamr	24	1	1	6 hanging	2	1	c	1	1	60	4	4	3311	2762	1	1
90	2016/03/233	1	periya muthan	48	1	1	6 opc	5	1	c	1	1	300	4	4	2512	2724	1	1
91	2016/01/035	1	selvaraj	38	1	1	3	6	2		1	1	300	5	5				
92	2016/01/036	1	jegathees	30	1	1	5	5	1	a	1	1	290	3	3	3289	3144	2	1
93	2016/01/043	2	krishna iyer	90	1	1	4		2		2	2	150	5	5				
94	2016/01/053	1	saraswathy	75	2	1	3	5	2		1	1	180	5	5				
95	2016/01/056	1	muthu sankar	26	1	1	5	5	1	a	1	1	180	2	2		3154		1
96	2016/01/58	1	ponnambalam	65	1	1	6 opc	5	1	c	1	1	300	4	3				
97	2016/01/061	1	dhasan	60	1	1	2	5	2		1	1	180	5	5				
98	2016/01/069	1	neelakandan	56	1	1	6 ckd	5	2		2	2	360	5	5				
99	2016/01/071	1	raja gopal	44	1	1	5	5	1	a	1	1	300	3	3	2463	2512	1	1
100	2015/12/1184	2	shanthilal	71	2	4 jainism	4		2		1	1	120	3	1				
101	2015/12/1176	2	sivaperumal	70	2	1	2		2		1	1	300	3	3	2808	2717	5	3
102	2015/12/1131	2	vasantha	70	2	1	4		2		1	1	300	5	5				
103	2015/12/1133	2	rajaram	84	1	1	6 ckd		2		1	1	240	2	2	3194		2	
104	2015/12/1140	2	gomathiammal	65	2	1	4		2		2		240	4					
105	2015/12/1148	2	chandra	70	2	1	2		2		2	2	90	4	4			3	3
106	2015/12/1159	2	pitchaimmal	80	2	1	2		2		2	2	150	5	5				
107	2015/12/1187	2	damodharan	78	1	1	4		2		2	2	150	5	5				
108	2015/12/1190	2	radhakrishnan	75	1	1	2		2		2	2	200	5	5				
109	2015/12/1194	2	jaisee rani	43	1	1	3		2		1	1	120	3	3	3236	2652	1	1
110	2015/12/1209	2	vatsala	70	2	1	3		2		1	1	45	4	5			3	3
111	2015/12/1210	2	guruvammal	85	2	1	3		2		2	1	330	5	5				
112	2012/12/1213	2	krishnan	77	1	1	3		2		2	2	300	5	5				
113	2015/12/1224	2	anusya	78	2	1	4		2		2	2	240	5	5				
114	2015/12/1228	2	pethaperumal	80	1	1	2		2		2	2	300	5	5				
115	2015/12/1235	2	savithri	70	2	1	2		2		1	1	190	4	4				
116	2015/12/1111	2	meenambal	75	2	1	4		2		2	2	120	4	4	2673	2421	1	4
117	2015/12/1115	2	ganga	61	2	1	3		2		2	2	90	2	1	2754	2801	1	1

118	2015/12/1161	1	suresh kumar	39	1	1	6 ckd		2		1	1	240	3	3	2500	2257	1	5
119	2015/12/1153	1	thiyagarajan	85	1	1	2	6	2		2	2	240	5	5				
120	2015/12/1109	1	subathra	84	2	1	6 ckd	6	2		2	2	300	5	5				
121	2015/12/1110	1	athinarayanan	47	1	1	6 opc	5	1	a	1	1	60	3	3	2739	2325	1	4
122	2015/12/1114	1	muthukamatch	31	2	1	5	5	1	a	1	1	210	1	1	3003	2762	1	1
123	2015/12/1118	1	sadhanadham	50	1	1	2	1	2		1	1	180	3	3			3	5
124	2015/12/1119	1	karuppusamy	41	1	1	5	5	1	a	1	1	300	3	3		3154	3	2
125	2015/12/1124	1	saravanan	31	1	1	5	5	1	a	1	1	60	2	2	3174	2724	3	3
126	2015/12/1144	1	ganesan	55	1	1	2	5	2		1	1	330	4	4	2386	2493	2	3
127	2015/12/1183	1	krisha kumar	17	1	1	5	5	1	a	1	1	120	2	2	3278		1	2
128	2015/12/1180	1	muthulakshmi	58	2	1	6 ckd	5	2		2	2	60	5	5				
129	2015/12/1189	1	chandra sekar	63	1	1	2	5	2		1	1	30	5	5				
130	2015/12/1223	1	muthukumar	23	1	1	5	5	1	a	1	1	240	4	4	3891	2881	1	1
131	2015/12/1236	1	velaichamy	20	1	1	5	5	1	a	1	1	300	4	4	3745	3571	1	1
132	2015/12/1202	2	srinivasan	70	1	1	2		2		1	1	180	3	3	2583	2645	1	1
133	2015/12/1208	1	jesuraj	38	1	3	6 electric	5	1	lectric sho	1	1	90	3	3	2688	3039	2	1
134	2015/12/1165	1	baby	60	2	1	6 ckd		2		1	1	330	3	3	3663	3003	1	1
135	2015/12/1231	1	gandhimathi	80	2	1	2		2		1	1	300	4	3	2816	3154	1	2
136	2015/12/1154	1	arunachalam	50	1	1	1	5	2		1	1	180	5	5				
137	2015/12/1145	1	arumugam	50	1	1	6 cellulitis	5	2		1	1	240	3	3	2197	2217	3	1
138	2015/12/1181	1	meenachi	36	2	1	6 hanging	5	1	c	1	1	120	3	3	2976	2890	1	1
139	2015/12/1146	1	muthupandi	35	1	1	3	6	2		1	1	60	3	3	3205	2857	1	1
140	2016/04/360	1	subbaya	40	1	1	5	5	1	a	1	1	180	5	3		3048		1
141	2016/04/359	2	ramesh	49	1	1	6 ckd		2		1	1	360	3	5	2793		1	
142	2016/04/357	2	mohan ram	75	1	1	2		2		2	2	180	4	4	1773		4	5
143	2016/04/355	1	manikandan	29	1	1	5	5	1	a	1	1	270	5	3		3663		2
144	2016/04/354	1	pakia selvam	30	1	1	6 hanging	5	1	c	1	1	45	3	3	3246	3039	1	1
145	2016/04/352	1	palpandy	45	1	1	5	5	1	a	1	1	300	3	4	2645	2994	1	1
146	2016/04/351	2	vijayalakshmi	75	2	1	2		2		2	2	300	5	5				
147	2016/04/347	2	ramakrishnan	75	1	1	2		2		2	2	180	5	5				
148	2016/04/345	2	kesavan	58	1	1	6 ckd		2		2	2	240	5	5				
149	2016/04/337	1	udayalan	30	1	1	5	5	1	a	1	1	300	3	3	3058	2753	1	1
150	2016/04/332	1	kankondan	40	1	1	6 opc	5	1	c	1	1	240	3	3	2857	2890	1	1
151	2016/04/325	2	krishna moorthy	73	1	1	6 ckd		2		2	2	190	4	4	2347	2469	1	1
152	2016/04/323	2	panchala kesan	74	1	1	3		2		1	1	120	5	5				
153	2016/04/322	2	vasanthi	55	2	3	6 sepsis		2		1	1	120	2	2				
154	2016/04/328	2	radha krishnan	85	1	1	2		2		2	2	120	2	2			5	5
155	2016/04/324	2	kuppamal	74	1	1	2		2		2	2	180	5	5				
156	2016/04/319	2	ramesh babu	55	1	1	6 sepsis		2		1	1	150	2	2				
157	2016/04/317	2	padmavathy	81	2	1	4		2		2	1	120	3	3	1930		4	4

158	2016/04/309	1	shanmugam	50	1	1	6 opc	5	1	c	1	1	240	3	3	2673	3115	1	1
159	2016/04/316	1	rajathavel	55	1	1	6 opc	5	1	c	1	1	150	3	3	2272	2336	3	3
160	2016/04/301	2	krishna moorthy	75	1	1	3				2	2	120	3	3			4	3
161	2016/04/336	2	kalanathi	44	1	1	2		2		1	1	120	2	2	3086	2890	1	1
162	2016/04/333	1	gomathi	39	1	1	6 opc		1	c	1	1	210	1	1	2487	2724	1	2
163	2016/04/361	2	variammal	80	2	1	2		2		1	1	240	4	4			3	3
164	2016/04/364	1	vairavel	22	1	1	6 opc	5	1	c	1	1	240	1	1	3125	3134	2	1
165	2016/04/368	1	bala murugan	42	1	1	5	5	1	a	1	1	180	4	4	2890	3174	3	1
166	2016/04/369	1	karthikeyani	33	2	1	5	5	1	a	1	1	210	3	3	3174	2638	2	1
167	2016/04/370	1	rani	40	2	1	6 opc	1	1	c	1	1	300	3	3				
168	2016/04/381	2	raja	75	1	1	2		2		1	1	300	4	4	3003	2873	5	1
169	2016/04/383	2	kowsalya devi	81	2	1	2		2		1	2	270	5	5				
170	2016/04/385	2	saraswathi	80	2	1	2		2		2	2	120	3	3				
171	2016/04/387	1	raja pandi	19	1	1	6 electric	5	1	electric sho	1	1	270	1	1	3039	3476	1	1
172	2016/04/311	1	harishma	5	2	1	2	5	2		1	1	300	2	2	3690	3831	1	2
173	2016/04/363	2	sulochana	80	2	1	6 ckd		2		2	2	120	3	4			3	7 k pro
174	2016/04/378	2	kuppumani ammal	84	2	1	2		2		1	1	330	2	3	2865	2695		5
175	2016/04/299	1	vijayakumar	58	1	1	3		2		1	1	120	2	2	2481		1	1
176	2016/04/306	1	krishnan	42	1	1	6 hanging	5	1	c	1	1	120	3	2	2840	2631	2	1
177	2016/04/298	1	devapandi	27	1	1	6 hanging	5	1	c	1	1	180	2	2	3184	2865	2	1
178	2016/04/310	2	janaki raman	65	1	1	2		2		1	2	180	3	3	2617	2975	1	1
179	2016/04/382	2	gopala krishnan	82	1	1	3		2		2	2	120	3	3			3	3
180	2016/04/296	1	dass	60	1	1	3		2		1	1	90	3	3	3012	3039	1	1
181	2016/04/313	1	rajendran	79	1	1	3		2		1	2	300	3	3			3	3
182	2016/04/372	1	ponnuthai	55	2	1	2		2		1	1	90	3	3	2610	2331	1	5
183	2016/02/148	1	ganesh	22	1	1	5	6	1	a	1	1	300	4	4	3144		1	5
184	2016/02/151	2	neelavathi	75	2	1	2		2		1	1	120	5	5				
185	2016/02/152	2	rajaram	88	1	1	3		2		1	1	240	3	3	2724	2237	1	5
186	2016/02/153	1	sethu ramesh	74	1	1	5	5	1	a	1	1	240	5	3				3
187	2016/02/154	1	guruvammal	80	2	`	4	6	2		1	1	120	5	5				
188	2016/02/156	1	muthu marriyappan	46	1	1	6 opc	5	1	c	1	1	180	3	3	2840	2832	2	2
189	2016/02/159	1	mookaiya	61	1	1	5	5	1	a	1	1	240	2	2	2941	2932	1	1
190	2016/02/160	1	ponnamal	60	2	1	5	6	1	a	1	1	300	5	4				
191	2016/02/162	1	rajamani	60	2	1	5	6	1	a	1	1	300	4	4				
192	2016/02/163	1	varatharajan	67	1	1	5	6	1	a	1	1	300	4	4				
193	2016/02/164	1	srinivasan	53	1	1	6 opc	5	1	c	1	1	120	3	3	2739	2500	1	1
194	2016/02/167	1	ramachandran	70	1	1	5	6	1	a	1	1	300	4	4				
195	2016/02/169	1	velliyappan	55	1	1	5	1	1	a	1	1	120	3	3	2695	2421	2	1
196	2016/02/198	1	nyanamuthu	53	1	1	5	5	1	a	1	1	180	3	3	2463	2710	1	1
197	2016/02/157	1	marimuthu	24	1	1	5	5	1	a	1	1	90	3	3	2976	2915	1	1

198	2016/02/214	2	krishna rao	61	1	1	3		2		1	1	300	3	2	2976	3058	1	1
199	2016/02/204	1	subramani	50	1	1	5	5	1	a	1	1	300	3	3	2904	2949	1	1
200	2016/02/205	2	krishna moorthy	75	1	1	2		2		2	2	120	3	3	2444	2252	1	1
201	2016/02/209	1	jothi mani	79	2	1	3	6	2		2	2	300	5	5				
202	2016/01/102	2	sankarachary	87	1	1	4		2		2	2	240	3	3	2262	2145		5
203	2016/01/95	1	manikandan	54	1	1	2	1	2		1	1	60	3	3				
204	2016/03/248	1	mani	70	1	1	5	5	1	a	1	1	30	3	3	3472	2521	2	2
205	2016/03/245	1	pandi	45	1	1	6 opc	5	1	c	1	1	240	3	3	2540	2409	1	1
206	2016/03/261	1	pandi	38	1	1	5	5	1	a	1	1	180	2	2	2710	2732	1	2
207	2016/03/256	1	arumugasamy	80	1	1	3	6	2		2	2	300	4	4			5	3
208	2016/03/246	1	venugopal	26	1	1	5	5	1	a	1	1	180	3	3	3344	3174	1	3
209	2016/03/223	2	kasthuri	65	2	1	6 ckd		2		2	2	120	4	4			3	3
210	2016/05/448	2	jaya lakshmi	79	2	1	4		1		1	1	240	3	3	3144	2739	1	2
211	2016/05/453	1	sanjay kumar	15	1	1	6 snake	1	1	d snake bite	1	1	180	1	5	3623		1	
212	2016/05/455	2	santhalal	71	1	1	6 ckd		2		2	2	240	4	4				
213	2016/05/456	2	baskaran	64	1	1	2		2		1	1	210	5	5				
214	2016/05/457	1	usha rani	41	2	1	5	1	1	a	1	1	120	3	3	2808	2739	3	3
215	2016/05/459	2	kubendran	77	1	1	2		2		2	1	180	4	4			3	3
216	2016/05/465	2	swaminathan	80	1	1	3		2		1	2	120	3	3				
217	2016/05/467	2	rajan	81	1	1	6 ckd		2		1	1	180	4	4				
218	2016/05/471	1	gurusamy	74	1	1	2	5	2		1	1	300	5	3				3
219	2016/05/473	2	srinivasan	82	1	1	2		2		2	2	240	3	3			5	5
220	2016/05/474	2	srenivasan	81	1	1	6 ckd		2		2	2	120	5	5				
221	2016/05/472	2	maruthambal	95	2	1	2		2		2	2	240	3	4				
222	2016/05/478	2	kowsalya rani	86	2	1	4		2		2	2	120	4	4				
223	2016/05/475	1	mokkaya pandian	42	1	1	6 opc		1	c	1	1	300	3	3	2801	3039	1	1
224	2016/05/450	1	natrajan	27	1	1	5	2	1	a	1	1	180	1	1	2906	3003	1	1
225	2016/05/441	1	murugesan	45	1	1	6 opc	5	1	c	1	1	90	2	2	2695	3048	1	1
226	2016/05/400	2	aanatha krishnan	90	1	1	2		2		2	2	180	3	3				
227	2016/05/432	1	saragan	30	1	1	5	5	1	a	1	1	240	3	3	2890	2777	1	1
228	2016/05/390	1	valar mathi	26	2	1	6 hanging	5	1	c	1	1	60	2	2	3021	3184	1	2
229	2016/05/393	1	arun pandian	27	1	1	6 opc	5	1	c	1	1	400	3	3		3194	1	1
230	2016/05/398	1	lakshmi	35	2	1	5	5	1	a	1	1	300	2	2	2754	2881	1	2
231	2016/05/399	2	kirubakaran	69	1	3	6 sepsis		2		1	1	180	3	3				
232	2016/05/403	2	kamala	90	2	1	2		2		2	2	210	4	4				
233	2016/05/404	1	vivek	22	1	1	6 hanging	5	1	c	1	1	180	2	2	3472	3891	1	1
234	2016/05/405	2	santhana krishnan	65	1	1	2		2		2	2	180	5	5				
235	2016/05/425	2	rajamani	76	2	1	2		2		2	1	180	3	3		2325	5	1
236	2016/05/424	2	ratha	75	2	1	2		2		1	2	90	4	4				3
237	2016/05/423	2	purushothaman	91	1	1	4		2		2	2	90	5	4				

238	2016/08/706	1	arun pandy	18	1	1	5	2	1	a	1	1	100	4	2	3436	3625	1	3
239	2016/08/644	2	valliamai	51	2	1	2		2		1	1	350	4	4			3	3
240	2016/08/699	2	krishnamani	65	2	1	4		2		1	1	300	4	4	2680	3205	3	2
241	2016/05/412	1	jayabalan	56	1	1	2	6	2		1	1	300	2	2	30303	2985	1	1
242	2016/05/447	2	subramaniam	75	1	1	2		2		1	1	180	4	3	2932		1	5
243	2016/06/556	2	velusamy	34	1	1	5		1	a	1	1	120	5	5				
244	2016/06/552	2	krishnan	74	1	1	2		2		1	1	120	2	1	2941	2724	1	1
245	2016/06/558	1	gurusamy	71	1	1	4	6	2		1	1	300	5	5				
246	2016/06/484	2	deepak nandalal	62	1	1	2		2		2	2	210	3	3			3	3
247	2016/08/672	2	devadas	67	1	1	6 sepsis		2		1	2	150	5	5				
248	2016/08/661	1	jayakumar	35	1	1	6 hanging	5	1	c	1	1	300	3	3	2985	2881	1	1
249	2016/08/658	2	shoba	50	2	1	4		2		2	2	300	3	3	1166	2958	3	1
250	2016/08/655	1	meena sundari	19	2	1	6 hanging	5	1	c	1	1	275	3	3	3076	3381	1	1
251	2016/08/653	1	ponnusamy	26	1	1	5	5	1	ccidental f	1	1	240	4	3	3424	3144	2	1
252	2016/08/650	1	raja gopal	65	1	1	5	5	1	a	1	1	150	4	4			3	3
253	2016/08/646	1	renuka	24	2	1	5	5	1	a	1	1	300	5	5				
254	2016/08/645	2	gomathy	74	2	1	2		2		2	2	120	4	4			5	5
255	2016/08/643	1	partha kali	60	2	1	4	6	2		1	1	30	3	3		2994	1	2
256	2016/08/690	2	sundarambal	86	2	1	3		2		1	2	240	3	3			3	3
257	2016/08/652	1	rajalakshmi	18	2	1	6 opc	5	1	c	1	1	100	1	1	3898	2952	1	1
258	2016/08/662	1	akil kumar	20	1	1	5	5	1	a	1	1	90	2	3	3134	3401	1	1
259	2016/08/649	1	mutusamy	48	1	1	5	5	1	a	1	1	250	3	3	2710	2518	1	1
260	2016/08/665	1	yamala	61	2	1	4	6	2		1	1	70	3	3	2463	2463	1	1
261	2016/08/708	2	boominathan	72	1	1	2		2		1	1	300	4	4	2808	2562	3	3
262	2016/08/671	1	dhvadidamai	70	1	1	3	6	2		1	1	300	3	3	2680	2493	1	1
263	2016/08/664	1	veera23	23	1	1	6 opc	5	1	c	1	1	60	2	2	3937		1	3
264	2016/08/705	1	kumaran	32	1	1	5	5	1	a	1	1	300	2	2	3205	3289	1	1
265	2016/07/560	2	saroja achi	62	2	1	4		2		1	1	180	3	3	2551	2398	1	5
266	2016/07/561	1	madhu pandi	27	1	1	5	5	1	a	1	1	360	3	5				
267	2016/07/563	2	shanthi54	54	2	1	6 ckd		2		1	1	120	3	3	2967	2932	2	1
268	2016/07/568	1	elangovan	45	1	1	6 opc	5	1	c	1	1	240	3	2	2564	2652	1	1
269	2016/07/569	1	karuppusamy	35	1	1	5	5	1	a	1	1	240	5	5				
270	2016/10/811	1	madhukumar	37	1	1	6 opc	5	1	c	1	1	240	3	3	2785	2695	1	1
271	2016/10/812	1	jeganathan	42	1	1	5	5	1	a	1	1	300	3	3			4	3
272	2016/10/814	2	indira	85	2	1	4		2		2	2	180	5	5				
273	2016/10/819	1	radha krishnan	64	1	1	3	6	2		1	1	210	3	3	2544	2557	1	1
274	2016/10/821	1	rajendran	58	1	1	5	5	1	a	1	1	180	3	3	2433	2702	3	1
275	2016/10/831	1	mohan17	1	1	1	5	5	1	a	1	1	210	2	2	2617	2941	1	2
276	2016/10/830	2	hari krishnan	84	1	1	3		2		2	1	120	2	2			3	3
277	2016/10/839	2	amsa	78	2	1	1		2		2	2	180	5	5				

278	2016/10/844	1	karthikeyan	27	1	1	5	5	1	a	1	1	300	5	5				
279	2016/10/845	1	mohan	36	1	1	5	5	1	a	1	1	300	3	3	2906	2849	1	7
280	2016/10/846	1	venkatesh	17	1	1	6 hanging	5	1	c	1	1	135	3	3	3367		1	3
281	2016/10/849	1	thirupathi	72	1	1	6 ckd	6	2		1	1	180	3	3	2890	2907	3	3
282	2016/10/850	2	meenambal	82	2	1	2		2		2	2	330	3	3			3	3
283	2016/10/851	1	chinnathai	65	2	1	2	6	2		2	2	300	5	5				
284	2016/09/773	2	kamalam	72	2	1	2		2		2	2	90	5	3				5
285	2016/09/749	1	rama subbha	73	1	1	1	6	2		1	1	180	2	2	2785	2949	2	1
286	2016/09/772	1	arunkumar	21	1	1	6 hanging	5	1	c	1	1	90	2	2	3546	3436	1	2
287	2016/09/779	2	sasikumar	39	1	1	2		2		1	1	150	3	3	2604	2358	1	1
288	2016/09/725	1	karthi raja	23	1	1	6 hanging	5	1	c	1	1	90	2	2	3115	3086	1	1
289	2016/09/723	1	gangaraj	56	1	1	5	5	1	a	1	1	180	4	4			3	3
290	2016/09/780	2	suriyakanthi	70	2	1	2		2		2	2	120	3	3			3	3
291	2016/09/714	1	kaliammal	40	2	1	5	5	1	a	1	1	250	2	2	3003	2557	1	1
292	2016/09/777	2	sekar	54	1	1	4		2		1	1	240	3	3	3412	2762	2	1
293	2016/09/761	1	gane muthu	30	1	1	6 opc	5	1	c	1	1	270	2	2	2717	2732	2	1
294	2016/09/764	1	mani	57	1	1	3	5	2		1	1	70	3	3	2457	2463	2	2
295	2016/09/765	1	anthoni	22	1	3	6 rat	5	1	c	1	1	150	3	3			7	5
296	2016/09766	1	kannaperan	55	1	1	5	5	1	a	1	1	240	3	3	2272	2695	5	1
297	2016/09/770	2	nagarathinam	84	2	1	4		2		2	2	120	4	4	1915		3	5
298	2016/09/771	1	arumugam	56	1	1	5	5	1	a	1	1	270	3	3	27754	2967	1	2
299	2016/09/773	1	kamala	71	2	1	2	6	2		2	2	90	5	3				5
300	2016/11/913	2	rangammal	87	2	1	2		2		1	1	100	4	4				
301	2016/11/888	1	ganasekaran	41	1	1	4		2		1	1	120	5	3		2525		1
302	2016/11/909	1	kannan	38	1	1	5	5	1	a	1	1	300	3	3	2257	2433	1	1
303	2016/11/893	2	mani kandan	57	1	1	5		2		1	1	210	3	3	2626	2457	1	1
304	2016/11/923	1	selvi	35	2	1	6 hanging	5	1	c	1	1	60	3	3	2512	2666	1	1
305	2016/11/919	1	selva raj	60	1	1	2	6	2		1	1	60	3	3	2570	2890	1	1
306	2016/11/877	1	rajeshwari	47	1	1	2	6	2		1	1	60	2	2	2631	2702	1	1
307	2016/11/905	1	ajay	10	1	1	5	5	1	a	1	1	240	3	3	3030		1	1
308	2016/11/951	1	saravanan	30	1	1	6 opc	5	1	c	1	1	270	2	2	3773	3484	1	2
309	2016/11/929	2	natarajan	68	1	1	2		2		1	1	180	4	4				
310	2016/11/932	1	pandiselvi	28	2	1	5	5	1	a	1	1	120	2	2	3215	3086	2	1
311	2016/11/933	1	ramar	52	1	1	6	5	1	c	1	1	40	4	4	2444	2631	1	2
312	2016/11/934	1	muthukumar	23	1	1	6 opc	5	1	c	1	1	300	1	1	2816	2932	2	1
313	2016/11/941	2	avvichy chettiar	89	1	1	2		2		2	2	120	5	5				
314	2016/11/943	2	ravi	48	1	1	2		2		1	1	300	3	3	2732	2695	1	1
315	2016/11/944	1	devaki	70	2	1	3	6	2		1	1	90	3	4				
316	2016/11/950	1	subbaiya	60	1	1	5	5	1	a	1	1	300	3	3	2347	2272	3	3
317	2016/09/763	2	sulochana bai	80	2	1	4		2		2	2	70	3	3		2469	5	1

318	2016/09/760	1	munivag	45	1	1	6 opc	5	1	c	1	1	60	3	3	2713		3	3
319	2016/09/757	2	pilchai	77	1	1	3		2		2	2	90	5	5				
320	2016/09/754	2	jaya moorthi	66	1	1	6 ckd	6	2		2	2	120	4	4			3	3
321	2016/09/751	1	sigamani	58	1	1	5	5	1	a	1	1	240	3	5	3144		2	
322	2016/09/745	2	raja	47	1	1	3		2		1	1	240	3	3	2652	2710	1	1
323	2016/09/738	2	suganthi	75	2	1	2		2		2	2	240	5	5				
324	2016/09/737	1	valli	37	2	1	6 opc	5	1	c	1	1	300	4	4	3236	2906	1	1
325	2016/09/736	1	muniyandi	70	1	1	3		2		1	1	60	4	3			3	3
326	2016/09/735	2	prema	79	2	1	6 ckd		2		1	1	240	5	5				
327	2016/09/734	2	subramani	51	2	1	2		2		1	1	240	3	3	2617	2570	1	1
328	2016/09/732	2	rajasekaran	70	1	1	4		2		1	1	120	5	5				
329	2016/09/731	1	ramuthai	80	2	1	2	6	2		2	2	85	3	3			3	3
330	2016/09/728	2	rajalakshmi	85	2	1	4		2		2	1	30	4	3			3	1
331	2016/09/727	1	kumaran	39	1	1	5	5	1	a	1	1	80	4	4	3030	2627	1	1
332	2016/09/724	1	yuvaraj	24	1	1	6 opc	5	1	c	1	1	280	3	3		2604	1	1
333	2016/09/718	2	shanmugam	88	1	1	4		2		2	2	300	5	5				
334	2016/09/717	1	rajeshwaran	22	1	1	6 opc	5	1	c	1	1	320	3	3	2849	2967	1	1
335	2016/09/715	1	eliya	70	1	1	1	6	2		1	1	280	4	4			5	5
336	2016/06/557	1	kamatchi	27	1	1	5	5	1	a	1	1	300	3	3	3355	3206	1	5
337	2016/08/674	1	sarava kumar	24	1	1	1	5	1	a	1	1	305	3	5	2967			
338	2016/08/675	1	harimuthu	49	1	1	5	5	1	a	1	1	40	2	2	2049	2531	1	1
339	2016/08/676	1	thirupathi	69	1	1	5	5	1	a	1	1	210	3	3	3355	3236	1	2
340	2016/08/677	1	johnson	53	1	3	5	5	1	a	1	1	60	2	1	2717	3030	1	1
341	2016/08/710	2	sandhya murthu	72	1	1	4		2		2	2	100	5	5				
342	2016/08/709	1	menaga	30	3	1	6	5	1	c	1	1	300	1	1	2857	2898	1	2
343	2016/05/443	2	balammal	81	2	1	4		2		2	2	120	4	5				
344	2016/05/440	2	rengachary	83	1	1	4		2		1	1	180	2	3	2481	2375	3	3
345	2016/05/439	1	subramani	31	1	1	6 opc		1	c	1	1	240	3	3	3508	3154	1	1
346	2016/05/436	2	thulasiammal	90	2	1	4		2		2	2	120	5	5				
347	2016/05/434	1	ramesh	43	1	1	3		2		1	1	75	3	3	3134	3508	1	2
348	2016/05/433	1	vinoth kumar	29	1	1	5	5	1	a	1	1	300	3	3	2949	2985	1	1
349	2016/05/431	1	kumar	74	1	1	3	6	2		1	1	210	3	3	2976	2314	2	1
350	2016/05/454	1	anjali devi	17	2	1	6 rat	5	1	c	1	1	180	1	2	3289	3311	1	1
351	2016/05/460	2	kandavel	50	1	1	2		2		1	1	360	2	2	3514	3003	1	1
352	2016/05/479	2	rajan	74	1	1	4		2		1	1	250	3	3	3039	2785	5	1
353	2016/05/451	1	sabari murugan	22	1	1	5	5	1	a	1	1	120	2	3	2873	3055	1	1
354	2016/05/408	1	karrupaiya	55	1	1	5	5	1	a	1	1	250	2	2	2695	3164	5	5
355	2016/05/476	1	suresh	26	1	1	6 opc	5	1	c	1	1	120	3	3	3378	3095	1	1
356	2016/05/480	1	amsavalli	42	2	1	5	5	1	a	1	1	145	2	3	3215	3164	1	1
357	2016/05/437	1	mariammal	45	2	1	6 ckd	6	2		1	1	340	3	3	2967	3048	3	3

358	2016/08/680	1	aravind	15	1	1	6 hanging	5	1	c	1	1	120	1	1	3048	2865	1	1
359	2016/08/681	2	selva rajan	67	1	1	6 ckd		2		1	1	240	3	3	2732		1	3
360	2016/08/683	2	savithiri	82	2	1	4		2		2	1	330	4	4			3	3
361	2016/08/686	2	sumithra	71	2	1	2		2		2	2	120	2	4	2380		1	3
362	2016/08/684	1	subramaniyam	61	1	1	6	5	1	c	1	1	75	3	3			5	3
363	2016/08/687	1	jayes	30	1	1	6	5	1	c	1	1	60	3	2	3205	3194	1	1
364	2016/08/688	2	vaga devan	83	1	1	2		2		1	1	275	3	3			3	3
365	2016/08/694	2	alagammal	80	2	1	4		2		1	1	120	4	4			3	3
366	2016/08/696	1	senthil kumar	37	1	1	6 hanging	5	1	c	1	1	45	3	3	2915	2673	2	1
367	2016/08/700	2	panchavarnam	81	2	1	2		2		2	1	60	4	4		2865	3	7
368	2016/08/702	1	kumar	37	1	1	6		1	c	1	1	360	4	3	2314	2433	2	3
369	2016/11/950	1	subbaiya	60	1	1	5	5	1	a	1	1	300	3	3	2347	2272	3	3
370	2016/11/927	1	buela florens	40	2	3	6	6	1	c	1	1	270	3	3	2444	2525	3	3
371	2016/11/925	2	dhanasekaran	42	1	1	2		2		1	1	180	2	2	2597	2404	3	3
372	2016/11/889	1	vasantha	55	2	1	6		1	c	1	1	120	2	2	2808	2645	1	1
373	2016/11/887	1	pandiyan	28	1	1	5		1	a	1	1	190	3	3			3	
374	2016/11/881	1	baskaran	35	1	1	5	5	1	a	1	1	480	4	4			3	
375	2016/11/879	2	vanitha	43	2	1	3		2		1	1	180	3	3	2695	2169	1	1
376	2016/10/866	2	vishwananthan	82	1	1	2		2		2	2	250	4	4				
377	2016/10/867	1	vicknesh pandy	18	1	1	6 hanging		1	c	1	1	180	2	2	3355	3448	1	1
378	2016/10/872	2	pandiaraj	75	1	1	4		2		2	2	300	3	4	2680		2	3
379	2016/10/873	2	rathina chettiar	81	1	1	4		2		1	1	180	3	3	2469	2610		
380	2016/10/876	1	suruli	66	1	1	2	6	2		2	2	25	4	4			5	
381	2016/10/874	1	solaiyappan	37	1	1	6 opc	5	1	c	1	1	65	5	5				
382	2016/10/862	1	rama krishnan	67	1	1	5	6	1	a	1	1	100	3	3			3	5
383	2016/10/861	2	shakunthal	70	2	1	2		2		1	1	210	2	3	2824	2906		
384	2016/10/860	1	kamadhesan	25	1	1	5	5	1	a	1	1	330	3	3	2985	2976	1	1
385	2016/11/895	2	yamuna	78	2	1	6 ckd		2		1	2	120	3	3	2415	2710	1	
386	2016/11/898	2	siva rama krishnan	45	1	1	2		2		1	1	135	3	3	3496	3030	1	1
387	2016/11/901	2	gandhi madhi	87	2	1	2		2		2	2	135	5	4				3
388	2016/11/907	1	raguman	22	1	1	5	5	1	a	1	1	335	3	3	2816	2976	1	1
389	2016/11/917	2	siva prasath	80	1	1	2		2		1	1	120	3	3			3	3
390	2016/11/918	1	aakash	16	1	1	5	5	1	a	1	1	180	3	3	3058	2958	1	1
391	2016/11/921	1	mookamammal	77	2	1	2	6	2		2	2	270	5	5				
392	2016/10/813	1	muthuvel	65	1	1	6	5	1	c	2	2	360	4	4			3	3
393	2016/10/824	1	mahalingam	56	1	1	5	5	1	a	1	1	180	3	3	2695	2604	1	1
394	2016/10/822	1	panchavarnam	35	2	1	5	5	1	a	1	1	150	3	3	2801	2617	1	1
395	2016/10/842	1	ram	58	1	1	6	5	1	c	1	1	160	3	3	2680	2538	3	3
396	2016/10/841	1	aswin karthik	19	1	1	6 opc	6	1	c	1	1	360	5	3		3154		1
397	2016/10/799	1	magadevi	17	2	1	6 hanging	5	1	c	1	1	170	3	3	3521	3597	1	1

398	2016/10/825	1	vijay	45	1	1	5	5	1	a	1	1	220	4	3		3039	3	2
399	2016/10/828	1	muthukrishnan	65	1	1	5	5	1	a	1	1	150	3	3				
400	2016/10/827	1	ponnusamy	45	1	1	5	5	1	a	1	1	300	2	4	2666	2816	2	1
401	2016/10/834	2	ramaniram	80	1	1	4		2		2	2	120	2	3				3
402	2016/10/838	1	kooodandi	47	1	1	5	5	1	a	1	1	255	3	3	2695	2551	1	
403	2016/05/416	1	pandy	44	1	1	5	5	1	a	1	1	240	5	5				
404	2016/05/488	1	vijayakumar	52	1	2	2	2	2		1	1	60	5	5				
405	2016/06/493	1	rajalakshmi	1	2	1	5	5	1	a	1	1	250	3	5			5	
406	2016/06/495	1	raja	35	1	1	5	5	1	a	1	1	100	3	3	3184	3039	1	1
407	2016/06/498	2	saroja	68	2	1	4		2		2	2	180	3	3			4	
408	2016/06/500	1	panjavarnam	75	2	1	2	1	2		2	2	255	3	3	1788	1706	5	5
409	2016/06/487	1	krishnan	70	1	1	2	6	2		2	2	255	3	3	1811	1406	3	4
410	2016/06/486	2	loganathan	76	1	1	2	6	2		1	1	300	4	4				
411	2016/09/775	1	mani	44	1	1	6 hanging	5	1	c	1	1	200	4	4			3	3
412	2016/09/713	1	madhu krishnan	40	1	1	6 opc	5	1	c	1	1	240	4	3			3	
413	2016/09/784	1	karan	15	1	1	5	6	1	a	1	1	310	4	4			3	3
414	2016/09/787	2	ramalingam	87	1	1	2		2		2	2	300	5	5				
415	2016/09/788	2	velayudhan	45	1	1	4		2		1	1	70	3	4	3067	2967	2	2
416	2016/09/789	1	muniyyappan	33	1	1	5	5	1	a	1	1	345	5	3		2890		1
417	2016/09/790	1	bala	53	1	1	3	6	2		2	2	330	3	3	3215	3125	3	3
418	2016/09/791	1	ananth	23	1	1	5	5	1	a	1	1	340	3	3			5	3
419	2016/09/794	1	murugan	40	1	1	6 opc	5	1	c	1	1	60	5	5				
420	2016/10/799	1	magadevi	17	2	1	6 hanging	5	1	c	1	1	270	3	3	3521	3577	1	1
421	2016/10/796	2	vatsala	65	2	1	2		2		2	2	90	5	4				
422	2016/10/800	2	selvakumar	29	2	1	5		2		1	1	75	4	4				
423	2016/10/805	2	venkatachari	88	1	1	4		2		2	2	330	5	5				
424	2016/10/810	2	sairam	63	1	1	4		2		1	2	160	3	3			5	5
425	2016/11/912	1	muthupandi	36	1	1	5	5	1	a	1	1	155	3	3	2732	3076	1	1
426	2016/11/882	2	rajalakshmi	84	2	1	2		2		1	2	330	3	5			3	
427	2016/10/856	2	rajammal	62	2	1	4		2		1	1	120	2	2	2702	2754	3	1
428	2016/10/855	1	rose mary	53	2	1	3	6	2		1	1	280	4	3	2801	3205	1	6
429	2016/10/870	2	sathish	45	1	1	2		2		1	1	195	3	3	3300	2808	2	2
430	2016/10/857	2	nirmala	70	2	1	2		2		1	1	195	3	3	3003	2976	1	1
431	2016/07/607	1	thanga pandi	16	1	1	6 hanging	5	1	c	1	1	90	2	2	3164	3289	1	1
432	2016/07/584	1	ananthi	18	2	1	6	5	1	c	1	1	10	2	2	4048	3523	1	1
433	2016/07/640	1	ravichandran	48	1	1	6 opc	5	1	c	1	1	60	2	3	2638	2747	1	1
434	2016/07/616	1	ramesh kannan	28	1	1	6 opc	5	1	c	1	1	400	3	3	2967	3237	1	1
435	2016/07/627	1	balaji	49	1	1	4	6	2		1	1	90	2	3	3048	3081	1	1
436	2016/06/542	1	palpandy	42	1	1	6 electric	5	1	electric sho	1	1	90	2	2	3215	2801	2	1
437	2016/06/541	2	damodran	66	1	1	2		2		2	2	300	3	3	2028	2331	4	3

438	2016/06/536	2	jayalakshmi	83	2	1	4		2		2	1	285	3	4	2132	1838	1	4
439	2016/06/534	2	meenakshi sundaram	70	1	1	2		2		1	2	135	1	1	2932	2881	1	1
440	2016/06/532	2	vidya	75	2	1	2		2		1	1	240	3	3		3012	3	1
441	2016/06/529	1	ramasamy	60	1	1	2		2		1	1	160	3	3	2801	2551	3	1
442	2016/06/528	1	nagaraj	45	1	1	3	3	2		1	1	120	5	5				
443	2016/06/525	2	sarojini	80	2	1	4		2		2	2	180	4	4				
444	2016/06/522	1	muthu	22	1	1	6 opc	5	1	c	1	1	210	2	2	2994	3012	1	1
445	2016/06/520	1	pechammal	62	2	1	2	6	2		1	1	270	3	3	2487	2222	3	1
446	2016/06/516	1	selvam	24	1	1	5	6	1	a	1	1	250	3	3	3278	3322	2	2
447	2016/06/515	1	visu antony	19	1	3	5	5	1	a	1	1	220	3	3	2777	3194	1	1
448	2016/06/501	2	sudan	70	1	1	2		2		1	2	150	5	5				
449	2016/06/502	2	rathinammal	75	2	1	2		2		2	2	210	3	3	2257	2222	1	4
450	2016/06/503	1	muthukumar	40	1	1	5	5	1	a	1	1	330	3	3			1	1
451	2016/06/504	1	raja mani	49	1	1	2	6	2		1	1	300	5	5				
452	2016/06/505	1	jakkamal	57	2	1	2	5	2		1	1	90	2	2	2941	3134	1	1
453	2016/06/507	1	muthu	27	1	1	6 hanging	5	1	c	1	1	420	3	3	2742	2754	1	1
454	2016/06/509	1	kamala	51	2	1	3	6	2		1	1	35	2	5	2816		1	
455	2016/06/510	2	nagasamy	79	1	1	2		2		2	1	90	4	5				
456	2016/06/512	2	ganga devi	83	2	1	2		2		2	2	250	3	4			5	
457	2016/06/513	1	gopinath	34	1	1	5	5	1	a	1	1	300	4	4			5	5
458	2016/07/598	2	mohan	62	1	1	2		2		2	2	60	4	4				
459	2016/07/601	1	muthulakshmi	35	2	1	5	5	1	a	1	1	245	5	4				
460	2016/07/602	1	muthusami	32	1	1	5	5	1	a	1	1	160	2	2	3521	3496	1	2
461	2016/07/605	1	thamarani selvam	30	1	1	5	5	1	a	1	1	120	2	2	3225	3184	1	1
462	2016/07/606	1	meena	40	2	1	4	5	2		1	1	270	3	3	2583	2816	1	1
463	2016/07/612	2	srinivasan	42	1	1	2		2		1	1	210	2	2	2932	3174	1	2
464	2016/07/614	1	sunderasan	40	1	1	5	5	1	a	1	1	300	3	2	2898	3076	1	1
465	2016/07/615	1	ravi chandran	26	1	1	4	5	1	a	1	1	240	4	5			4	
466	2016/07/617	1	ranjith	16	1	1	5	5	1	a	1	1	240	2	2	3076	3184	1	2
467	2016/07/620	2	nagamani	87	1	1	6 ckd		2		1	1	90	2	2	2890		1	1
468	2016/05/422	2	saradambal	75	2	1	4		2		2	1	120	3	4	2178		1	3
469	2016/05/421	2	santha	88	2	1	4		2		2	2	180	4	5				
470	2016/05/427	1	cinnamal	60	2	1	4	6	2		1	1	135	3	3			1	1
471	2016/10/847	1	nagalasamy	28	1	1	6 hanging	5	1	c	1	1	105	3	3	3367		4	
472	2016/10/853	1	krishnasamy	48	1	1	5	5	1	c	1	1	210	5	5				
473	2016/10/851	1	chinathai	65	1	1	2	6	2		1	1	300	5	5				
474	2016/07/594	1	vijaykumar	30	1	3	6 opc	5	1	c	1	1	135	3	3	3367	3787	1	1
475	2016/07/622	1	sampoornam	68	1	1	5	5	1	a	2	2	75	4	4			3	3
476	2016/07/626	1	neerga thilaga	60	1	1	5	5	1	a	2	2	60	4	4	1980	1919	3	5
477	2016/07/629	1	nagaraj	58	1	1	5	5	1	a	1	1	210	3	4			3	5

478	2016/07/631	1	bhau babu	58	1	1	6 opc	5	1	c	1	1	240	3	3	2879	2801	1	1
479	2016/07/639	1	muthu irulayee	71	2	1	2	6	2		2	2	45	3	3			5	5
480	2016/07/578	1	sakthivel	28	1	1	5	5	1	a	1	1	210	2	2	3322	2386	4	1
481	2016/07/623	2	indumathi	61	2	1	2		2		1	1	170	2	1	2450	2341	1	1
482	2016/07/592	2	ramakrishnan	53	1	1	2		2		1	1	300	3	3		3484	3	3
483	2016/07/595	1	selvaraj	34	1	1	6 hanging	5	1	c	1	1	300	3	3	3289	3906	2	1
484	2016/07/596	1	rangaraj	54	1	1	6 electric	5	1	electric sho	1	1	100	2	2	2489	2673	1	1
485	2016/07/591	1	ganesan	57	1	1	3	6	2		1	1	300	3	2	3289	3401	1	2
486	2016/07/589	1	sathiyaraj	25	1	1	5	5	1	a	1	1	110	3	3	2595	2415	1	3
487	2016/07/588	1	karthik	25	1	1	5	5	1	a	1	1	315	3	3			4	3
488	2016/07/587	2	rajaram	79	1	1	2		2		1	1	120	4	4				
489	2016/07/577	1	jagadesh	29	1	1	6 opc	5	1	c	1	1	210	2	2	2958	3048	2	1
490	2016/07/576	1	bala krishnan	34	1	1	5	5	1	a	1	1	40	5	5				
491	2016/06/539	1	jakkammal	45	2	1	6	5	1	c	1	1	45	2	2	2398	2747	1	1
492	2016/06/506	2	chandrasekaran	72	1	1	2	5	2		1	1	270	3	4	3095	2785	1	1
493	2016/06/543	1	vijay	22	1	1	5	5	1	a	1	1	270	3	3	2873	2688	1	1

PLAGIARISM REPORT

URKUND

Urkund Analysis Result

Analysed Document: thesis final copy.docx (D30959399)
Submitted: 10/2/2017 6:58:00 PM
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Significance: 7 %

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système antiplagiat.docx (D6339707)
https://en.wikipedia.org/wiki/Penetrating_keratoplasty_surgery

Instances where selected sources appear:

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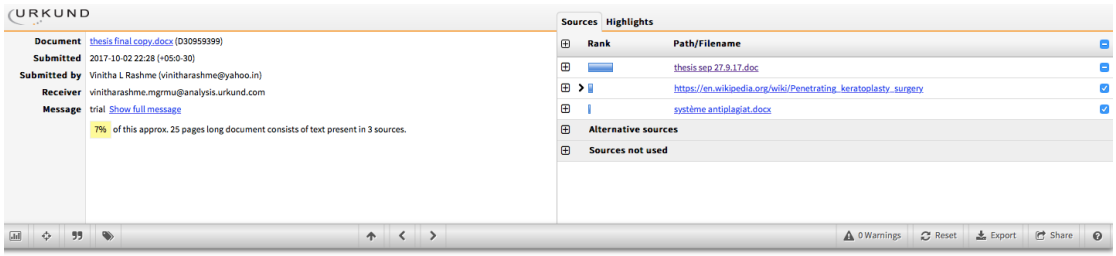
PLAGIARISM SCREEN SHOT



INTRODUCTION: WHO states that 285 million people are estimated to be visually impaired 39 million are blind and 246 have low vision. National program for control of blindness in india estimated the prevalence of blindness to be 1.1%. Major cause of blindness are as follows: cataract (62.5%) refractive error (19.70%) corneal blindness (0.9%), glaucoma (5.80%), surgical complications (1.20%) posterior capsular opacification (0.90%) posterior segment disorders (4.70%), others (4.19%). Corneal blindness is the second leading cause of blindness in developing countries. According to Rapid assessment of avoidable blindness conducted in India by MOH & FW 2006-2007 corneal blindness constitutes 1% of total blindness. 1.22 lakh are bilaterally corneal blind in the country.25, 000 -30,000 cases are added every year.(15) 90% of global cases of ocular trauma and corneal ulceration causing blindness happens in developing countries(2)

Corneal blindness when compared to cataract affects younger population and hence has higher Disability -Adjusted Life Years (DALY) score.(9)

The major causes of corneal blindness in India are ocular trauma, infectious keratitis, pseudophakic bullous keratopathy, hereditary dystrophies, corneal injury, trachoma and vitamin A deficiency.(2)

Effective public health stratergies can reduce the load of corneal blindness but corneal transplantation remains a major option for treatment of blindness due to corneal opacity(3).

Out of 1.22 lakh corneal blindness only 60,000 are eligible for PKP due to pre existing posterior segment pathology and 20,000-30,000 cases are added to the case pool every year.(15). Hence a constant supply of high quality donor corneal tissues are required to reduce the prevalence of corneal blindness. The factors that determine the outcome of the transplantation are quality of donor cornea, the underlying corneal pathology of the recipient and appropriate post operative care. The main goal of the eye bank is to procure and supply quality donor corneas to the corneal surgeons. Only 50% of donor corneas are utilized for optical keratoplasty. (15) Eye banks collect 50,000 corneas per year on average and so we need 2 lakh corneas per year to meet the demand.

In order to increase the number of corneas retrieved Eye bank introduced Hospital cornea retrieval program. Here eye donation counselors approach the family of the potential donor as soon as they receive the death notification. They motivate the family members and encourage them to donate the eyes of the deceased. The advantages of HCRP are availability of young donor, easy collection of blood for serology, availability of medical records, reduction of death to enucleation time, good quality tissue(8). So our aim is to study the efficacy of HCRP by comparing it with Home retrieval